

THE LARYNGOSCOPE.

VOL. XIV. ST. LOUIS, MO., OCTOBER, 1904. No. 10.

ORIGINAL COMMUNICATIONS.

(Original communications are received with the understanding
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RELATIONS OF LARYNGOLOGY, RHINOLOGY, AND OTOTOLOGY WITH OTHER ARTS AND SCIENCES.*

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MR. PRESIDENT, LADIES AND GENTLEMEN:

When Professor Newcomb's extremely flattering invitation reached me to deliver an address before the Section of Laryngology and Otology of the Congress of Sciences and Arts held in connection with this wonderful Exhibition, my first feeling was naturally one of sincere gratitude for the great honor done to me. This feeling was enhanced by the information contained in Professor Newcomb's letter that the invitation was extended on the nomination of a number of American representatives of medicine, whose names are household words on the other side of the Atlantic. I am deeply sensible, believe me, of the exceptional distinction thus conferred upon me, and my pleasure in accepting it is only marred by the consideration that I cannot pretend to be an aurist, and that the otological part of my task would no doubt have been infinitely better fulfilled by many European representatives of that branch. I dutifully mentioned this fact to the organizers of the Congress, but it was not considered an insurmountable obstacle to my undertaking the pleasant duty conferred upon me. Needless to say, I will do my best to do justice to the otological part of my address as well, but it will be intelligible to my hearers, and will, I trust, be pardoned by them that the lion's share of my remarks will be devoted to subjects rather of which I can speak from personal experience, than to questions with which my work is less intimately connected.

* Prepared for and read at the International Congress of Arts and Sciences, St. Louis, on September 21st, 1904

If my first feeling on receiving your invitation was naturally and properly a sense of gratitude for the high distinction conferred upon me, this feeling was run very close by the sincere pleasure I experienced in thinking that I should have been selected to co-operate in a work so entirely sympathetic to me as is this great undertaking. It was stated in Professor Newcomb's invitation that the object of this Congress was "to discuss and set forth the uniformity and mutual relationship of the sciences, and to thereby overcome the lack of harmony and relation in the scattered special sciences of our day."

I do not know whether I was selected as having upheld throughout my scientific career this leading idea, but I can say without fear of contradiction—and in proof thereof I may point to my literary work—that I have consciously and intentionally striven, wherever opportunity offered itself to me, to maintain the principal which animates the organizers of this Congress.

I should not be a specialist if I did not firmly believe in the necessity of specialism in medicine. The immortal aphorism, "Life is short, art is long, technique is difficult," applies today with even greater force than when it was uttered two thousand years ago by the Father of Medicine. Whilst the span of life has since his time remained very much what it was then, his art has been, and is, making giant strides. Economical considerations stand in the way of indiscriminately prolonging the time of medical study, and more and more work has to be compressed within the span of the few years which serve to prepare the future medico for his professional life. No wonder, then, that it has become extremely difficult, nay, almost impossible, to equip our students so thoroughly that they can enter practical life with full knowledge of their craft in every branch of medical thought and work. Even the few, who, endowed with good health and strength, with exceptional abilities, and with equally exceptional industry, succeed during their students' career in mastering all the details of current medicine will, with very rare exceptions, find it practically impossible, when once they have plunged into practice, to keep abreast of the rapid progress which is the signature of the times in which we live.

Under these circumstances division of labor has become a logical and unavoidable necessity. The old line of demarkation between internal medicine and surgery, to which, at a somewhat later period, gynaecology and midwifery were added as independent branches, no longer suffices to carry on investigation and practice within their formerly strictly defined limits. Gradually one recognized specialty has developed after another, partly owing to the necessities of special training in a certain technique, partly because only men trained in that technique could promote further investigations.

The International Medical Congresses bear testimony to this unavoidable development of contemporaneous medicine. Their organizers desire nothing more than to limit the number of the Sections of the Congress, yet time after time is it found indispensable to create new sections. Thus, whereas at the International Medical Congress of Brussels in 1875 eight Sections sufficed to carry on the work, which was truly representative of the state of scientific medicine at that time, that number had been more than doubled twenty-five years later, when no less than seventeen Sections had to be formed at the International Medical Congress of Paris of 1900! Seeing the unexpected rise of so many branches formerly undreamt of within the memory of our own generation, he would be a bold man indeed who would dare to assert that the limit had been reached of further specialization of our science.

This progressive division of labor—the outcome, not of individual caprice, but of stern necessity—has certainly resulted, within the last fifty years, in greater progress of medical knowledge and power than has taken place at probably any corresponding period in the history of medicine. If we middle-aged men remember what medicine was when we entered upon our studies and see what it is today, and if we further reflect how much of all the progress achieved meanwhile is due to the labors of specialists, we have every reason I think to be grateful to the division of labor which has brought forth such splendid fruit.

But while this must be readily and ungrudgingly acknowledged, it cannot be denied that, as in almost every movement of a similar character, thus in this development of modern medicine there is one great and real danger, namely, the peril of over-specialization. Well do I remember, when I first selected a specialist's career, how incensed I was at the reproach then currently leveled at specialism, namely, that it engendered narrow-mindedness, and how ill-founded and unjust that reproach seemed to be to me. With longer experience and riper judgment I have learned that the danger of narrow-mindedness, accruing from too exclusive a devotion to specialism, is more than a mere phantom. Whether by natural turn of mind, or by want of steady connection with broader aspects of pathology, there is no gainsaying that the enthusiastic specialist is apt to see a local trouble everywhere, and to overlook disturbances of general health and other organs which in reality require the chief attention. The tendency which has become particularly marked during the last decade, namely, to confine research and discussion in special subjects to special societies and special journals, has materially increased that danger, the reality of which was foreseen nearly twenty years

ago by my great teacher Virchow when in the address he gave at the jubilee meeting of the Berline Medical Society on October 28th, 1885, he spoke the memorable words, to which I have more than once referred, and which in verbatim translation are as follows:

Amongst us has arisen the large army of specialists, and it would be useless, or at any rate fruitless, to oppose this development; but I think I ought to say here, and I hope to be sure of the consent of you all when I say it, that no speciality can flourish which separates itself completely from the general body of science; that no speciality can develop usefully and beneficially if it does not ever and ever again drink from the general fount, and if it does not remain in relationship with other specialities, so that we all help one another, and thereby preserve for science, at any rate, even if it should not be necessary for practice, that unity on which our position rests intrinsically, and, I may well say also, with regard to the outer world.

Under these circumstances it was certainly a happy thought to remind us again of the unity of Sciences and Arts, and to try thereby to overcome the lack of harmony and connection between the scattered special sciences of our day.

And I look upon it as a particularly characteristic sign of the times, and as a hopeful augury for the future, that the reminder should have come from the scientists of a country so eminently progressive as the United States of North America. If they, who are untrammelled by many of the traditions, formalities, and prejudices which so severely handicap us on the other side of the Atlantic, have found that it is high time to raise a warning word against the ever-increasing disruption of the unity of Science, surely this ought to make those pause who, with a light heart, consider every further step on the road to so-called "independence" as a practical gain to specialism. If today, by placing before you in rapid succession the intimate links which connect us with other arts and sciences I should succeed in convincing some of the more ardent protagonists of such independence, that laryngology, rhinology, and otology can only flourish and healthily progress by never for a moment losing sight of their close relationship with other often enough apparently remote branches of human thought, I conceive that I shall have contributed my mite towards the excellent object of this great Congress.

It is not a mere figure of speech when I say that the more I advanced in the preparation of this address the more did I become impressed with the magnitude of my task, and with the intimacy of unexpected or hardly-thought-of connections between laryngology, otology, and rhinology and other sciences and arts. These speciali-

ties have developed so much along characteristically independent lines that theoretically one might be inclined to think that they had comparatively little in common with other branches of medicine, let alone other sciences and arts.

Nothing could be better calculated to destroy such mischievous belief than the results of my inquiry. At every step during the preparation of this paper has it become clearer to me how much we owe to apparently remote lines of human thought, how much we have been and are benefited in our special work by progress made in other distant fields, and how much more good we may expect to accrue to us from the advances achieved in territories of human thought, which a few years ago even the most fantastic visionary could not have brought into useful combination with our own occupation.

It will be my endeavor in this address to justify the foregoing statements by rapidly surveying the intimate connection of laryngology, rhinology, and otology—in addition to their relations with other branches of medicine—with physics, chemistry, mathematics, philosophy, history, biology, technology, and music, and I only regret that within the limit of time allotted to me it will be quite impossible to do full justice to my task.

I. PHYSICS.

(a) *Light*—Let us first take physics. The connections of that science with laryngology, rhinology, and otology are as manifold as they are interesting and important. The branches of medical science named have it in common that they deal with the investigation of the physiology and pathology of deep-seated cavities. Hence the question of their illumination for purposes of examination is of the greatest importance, and thus the chapter of physics dealing with the properties of light is a subject of immediate and pressing interest to us all. This applies with particular force to laryngology. Although of late, through the work of Kirstein, direct inspection of the larynx by means of depressing the tongue with suitable spatulas has been rendered feasible, this method of examination is only applicable in a certain fraction of cases, and examination of the larynx is still carried out universally by means of reflecting mirrors. The very foundation of laryngoscopy, as ordinarily practiced, depends upon the principle of physiological optics; that when rays of light fall upon a reflecting surface placed in a certain inclination towards the source of light, the angle of reflection is equal to the angle of incidence. Thus, if a small mirror be held at an angle of 45 degrees to the horizon just below the uvula, whilst a powerful

beam of light is thrown horizontally into the throat of the person examined, the part just underneath the mirror, that is, the larynx, becomes illuminated by reflected light, and its image is in turn thrown back upon the mirror, and hence reflected into the eye of the observer, which is parallel with the rays thrown upon the reflecting surfaces. Exactly the same principle applies if, instead of the larynx, the naso-pharyngeal cavity has to be examined, and the law of physiological optics just described is as all-important for posterior rhinoscopy as it is for laryngoscopy. But in order to obtain a really good image of either the larynx, or of the naso-pharyngeal cavity it is necessary that the light, which is thrown upon the reflecting mirror, should be a powerful one. Hence every progress, which is made in concentrating and intensifying the light used for illumination of these parts is of the greatest interest for my branch of science. It sounds now-a-days almost like a myth, that the progress of laryngology in its infancy should have been retarded for almost half a year, and that Professor Türck, of Vienna, who first utilized Manuel Garcia's epoch-making discovery of the laryngoscope for the investigation of pathological processes in the larynx, should have given up his studies for the time, because the winter of 1857 in Vienna was a very dark one, and because sufficient light for illumination of the larynx could not be obtained from the direct rays of the sun. Yet such was actually the case, and it was only, as Morell Mackenzie has tersely stated, through Professor Czermak's substituting artificial light for the uncertain rays of the sun, and using the large ophthalmoscopic mirror of Reute for concentrating the luminous rays that the initial difficulties were overcome. Thus already at this early stage, lenses, another achievement of physiological optics, were employed to help our young science. Ever since, every improvement in the way of light has been a subject of the keenest interest for laryngology and rhinology. What progress have we made from the *Schusterkugel*,—a large glass globe filled with water, originally employed by Türck and Stoerk—until we have been actually enabled to introduce a small electric lamp into the cavities of the body themselves to illuminate them properly for purposes of diagnosis and operation, or to throw light into the œsophagus or the bronchial tubes, or to transilluminate the face for diagnostic purposes, as, for instance, for the diagnosis of disease of the maxillary antra, or the frontal sinuses!

The employment of gas, recently followed by its new incandescent modification; the introduction of hydro-oxygen light, and, above all, that wonderful source of light, now in general use, the electric, have formed so many steps in the way of improving our powers in

laryngology and rhinology. Quite recently the invention of the Nernst lamp has proved a great boon to us enabling those who had been accustomed to the, if excellent, rather cumbersome use of hydro-oxygen light, to get illumination almost equally good at infinitely less trouble.

As if this had not been progress enough within the comparatively short span of a quarter of a century Professor Roentgen's great discovery of the penetrating power of the ultra-violet rays, which now go by his name, has, at its very inception, been most happily utilized for the purposes of laryngology. When the extraordinary properties of the X-Rays were made known I expressed a hope that by their help it might become possible to distinguish, owing to their different density, between benign and malignant growths. Although this hope has, unfortunately, not been realized so far, yet the medical attainments of these rays are surely wonderful. They enable us to discover the presence of metallic foreign bodies in the larynx, the lower air passages, the nose and its accessory cavities. When it is doubtful whether paralysis of a vocal cord is due to the presence of an aneurysm, or of a solid new growth in the chest pressing upon the pneumogastric or recurrent laryngeal nerves the X-Rays again come to our aid and help us to make a differential diagnosis. A further very ingenious application of the Roentgen rays has been made by Dr. Spiess, of Frankfort-am-Main, who has suggested that the delicate and by no means dangerless probing of the frontal sinus may be controlled and thereby rendered innocuous if during the act of introducing the probe the picture of the patient's head be thrown on the screen, the operator being thus enabled to see whether the instrument is really on the right way into the frontal sinus.

Who will be bold enough to say that with such discoveries the resources of physics have been exhausted, and that possibly at some near future some other even more powerful source of light may not be introduced? Those who are unwise enough to believe in the finality of scientific progress need simply be reminded of the possibilities quite recently introduced through the discovery of radium with its as yet imperfectly-known properties.

Before leaving the subject of light I must refer to some other methods in which that branch of physics has been rendered useful to our specialities.

The Microscope.—The first of these is the use of the microscope. On this point I need say but little. The enormous value of the microscope in medicine is so universally recognized that it would mean carrying coals to Newcastle if I were to enlarge upon it: Our

specialities have been benefited as much in the understanding of the finer processes of normal and pathological anatomy of the throat, nose and ear, as any other branch of our mother science. It suffices to mention the help which the microscope gives us in the differential diagnosis between benign and malignant growths, in the recognition of tuberculous and diphtheric affections, in the differentiation of septic disease in general, to show the truth of my statement.

Stroboscopy.—Another, though much more restricted application of light for the use of laryngology, is stroboscopy. By an ingenious modification of the stroboscope, consisting of two rotary discs, the one perforated, whilst on the other figures are drawn, which are inspected through the perforation of the first disc, the late Professor Oertel has succeeded in constructing an apparatus by means of which the oscillation of the vocal cords can be accurately observed. Very interesting observations on the action of the vocal cords during singing have been made with the aid of this apparatus, as an example of which I may only mention that, according to Oertel, "the sounds of the chest register are produced by oscillation of the vocal cords in their entire length and breadth, whilst the sounds of the falsetto register are caused by the longitudinal division of the surfaces of the vocal cords into aliquot parts, nodules being at the same time formed on them."

Photography.—A further method to be mentioned in this connection is photography. I need not say that photographic reproduction of preparations illustrating the normal and pathological anatomy of the ear, the nose, and the throat is no exclusive property of laryngology, rhinology, or otology, but a special interest connects the former of these sciences with photography, inasmuch as by the aid of this method a number of most interesting observations have been made on the physiology of the larynx during the act of singing. The method has proved particularly useful in showing the absurdity of the preconceived ideas of some teachers of singing as to the extent of the individual registers. It has fully corroborated the views held by those most competent to speak as to the enormous variety in producing the singing voice, even in persons whose voices belong to one and the same category. The pioneer in this fascinating territory has been an American, my friend Dr. French, of Brooklyn, and to his enthusiasm and perseverance have been due the first reliable results of this most promising method of physiological investigation. Further studies in this direction have been made by Dr. Muehold and Professor E. Meyer, of Berlin. The last-named gentleman has just, in co-operation with the celebrated mechanician, Zeiss, of Jena, constructed a very ingenious apparatus for demon-

strating and photographing the larynx; but having seen the photographs obtained by its use, I am bound to say that the work done by Dr. French has not been so far surpassed.

Stereoscopy.—Finally, in connection with light, I must not omit to mention the ingenious application of stereoscopy for purposes of medical teaching made by my friend, Dr. Watson Williams of Clifton in the wonderful atlas which accompanies the second edition of his work on Diseases of the Upper Respiratory Tract. It being often extremely difficult to obtain, for teaching purposes, really illustrative preparations of the accessory cavities of the nose, the employment of the principal of stereoscopy in order to substitute photographs, the plasticity of which truly rivals life, may fairly be described as a triumph in utilizing for our special purposes the achievement of an apparently very remote science.

The mention of electricity, the X-Rays, and radium naturally brings to our minds the fact that the chapter on light is of interest to laryngologists and rhinologists, not from the point of view of the question of illumination alone. We are privileged to live in a time when the great healing powers of light have been discovered and are utilized in a class of cases in which there is much need for addition to our therapeutic armoury. The light of the sun, the electric light, the ultra-violet rays, and the emanations of radium are nowadays utilized with much success for the treatment of lupus, of rodent ulcer, and of some of the more superficial forms of malignant disease; and it may fairly be hoped that further progress may be made in the treatment of these cruel affections, even when they occur in parts not easily accessible to the effects of the various rays.

(b) *Sound.*—Whilst the chapter of physics dealing with light and its powers is, as I have just endeavored to show, of the very highest importance for laryngology and rhinology, the chapter on sound holds an equally high position with regard to otology. I need not elaborate that a science which is prominently concerned in dealing with the troubles of hearing is inseparably connected with the physics of sound. Thus the tuning fork is one of the most indispensable weapons of the aurist, and the question whether the sounds caused by its vibrations are more easily perceived by aerial or by bone conduction is of the highest diagnostic importance in a large number of ear affections. In the same category may be mentioned Galton's whistle for the testing of the hearing of high notes. Again, the question of the capacity for the perception of tune; the difference in perception according to whether the mouth is closed or open; interference phenomena; the estimation of the hearing capacity for speech; the audibility of different sounds; the differential diagnosis

between affections of the sound conducting and sound-perceiving apparatus—are all questions intimately connected with the physics of sound, and it might be said without exaggeration that otology without constant close relationship with physics is an impossibility.

The Phonograph.—Speaking of sound, the phonograph, an invention due to American genius, must not be forgotten, although its possibilities in connection with our triad are still in their infancy. I may remind my hearers that very shortly after its introduction Dr. Mount Bleyer, of New York; Dr. Lichtwitz, of Bordeaux, and I, independently of one another, conceived the idea of utilizing its recording powers for the purposes of instruction. One does not always have a case of whooping cough at hand if one lectures on that disease, and although it be easy and true enough to say that the peculiar cough connected with that disease was so characteristic that any one who had ever heard it, would never forget it, it is not so easy to practically demonstrate in what the characteristics of which one speaks consist. Here the phonograph comes to one's aid; let the child afflicted with that disagreeable affection cough a few times into the apparatus, and turn it on, when you have to lecture on whooping-cough, and have no illustrative case near. The whoop will come out true enough!

It need not be said that the investigation of different forms of cough and hoarseness is only one of the modes in which the discriminating powers of the recording mechanism of the phonograph could be utilized. Attempts have already been made by Dupont to investigate with its help modifications of speech in different forms of delirium, paralysis, multiple sclerosis, etc. More recently Flatau of Berlin has studied the various forms of vocal disturbances by means of Edison's phonograph, and has also utilized it for investigation of the finer mechanism of the singing voice. With further perfection of the apparatus it may justly be hoped that yet more valuable results may be obtained than those so far achieved, although even now they are anything but a negligible quantity.

The Sensitive Flame.—Finally, in this connection, it should be mentioned that Königs, sensitive flame has been utilized for the registration of sound waves produced by the human voice. The apparatus consists of a rapidly rotating cube, the four lateral sides of which are formed by mirrors, and of a membrane in the side of a gas chamber, connected with which is a small sensitive gas flame. If a note be sung on to the membrane the flame bobs up and down, and the waves seen on the mirrors are not simply up-and-down ones, but the primary large waves are complicated by smaller ones

on their surface. The richer the voice the more numerous are the overtones of the harmonics represented on the reflecting sides of the rotary cube. (Halliburton).

(c) *Electricity*.—The enormous progress of the science of electricity made within our generation has had the most useful effects upon the diagnostic and therapeutic powers of laryngology, rhinology, and otology. In fact, there are probably few collateral sciences in which our speciality is so keenly interested, and the progress of which so greatly benefits us, as electricity in all its different forms. It has already been stated that the illuminating power of the electric light is being utilized not only for ordinary, but also for transillumination of the cavities of the head and neck, and for the inspection of the lower air and food tubes. The constant and faradic currents are of the greatest help to us, both in diagnosis and in treatment. By means of the reaction of degeneration we are enabled to decide whether paralysis occurring in the mouth, the pharynx, or the larynx is of central or of peripheral origin. By employing both forms of current we succeed in many cases in curing paralytic disorders, more particularly when they are of functional character.

Again, electricity in the form of the galvano-cautery is of practically daily use in the hands of the laryngologist and rhinologist. It has superseded the employment of most other forms of caustics, and few laryngologists nowadays would care to be without it.

Yet another form of employment of electric force, namely, electrolysis, is highly extolled by some adherents who utilize it for the treatment of such troublesome affections as ozæna, naso-pharyngeal fibromata, reduction of irregularities of the nasal septum, etc. It must, however, be confessed that this method has never met with general adoption by the bulk of laryngologists.

Finally, in recent times the motor power of electricity has been largely used, and I do not think anywhere more than in the United States, as the driving force of such instruments as trephines, saws, drills, particularly in nasal surgery and electro-motor masseurs in aural therapeutics. If the method has not yet met with general acceptance in Europe it is, I think, more from want of acquaintance with it than from any other cause, and I feel confident that the more general the domestic use of electricity will become the greater role will the electro-motor play in our instrumentarium.

Even as it is now, however, the rapid sketch I have just drawn will suffice, I trust, to show the enormous importance of this branch of physics for our special field of research.

II. CHEMISTRY.

Whilst it cannot be said that chemistry, apart from its general relations with medicine, is so closely connected in its various branches with laryngology, rhinology, and otology as physics are, yet there are points enough of very great and immediate importance which link these two sciences together.

In the first place, synthetic chemistry gains every day in importance for us by enriching us with new and important pharmaceutical preparations. Need I remind you of orthoform, anaesthesine, adrenalin, iodoform, sozoiodol, peroxide of hydrogen—to mention a few only of the large number of new remedies which form, so to say, our present stock-in-trade, and for the introduction of which we are indebted to synthetic chemistry? Every day increases our power of doing good, due to the progress made in this collateral science, and we are therefore accustomed to constantly watch now-a-days for further help in our therapeutical powers from that source.

Sceptics, it is true, may say with some show of reason that we had lately had and were still having a little too much of a good thing in the shape of new remedies, but I the more gladly leave that undecided, as chemistry comes to our aid not only with regard to therapeutics but also to diagnosis. It is mostly by means of the different chemical reactions of cerebro-spinal fluid, and of the ordinary serous secretion met with in vasomotor affections of the nose that we can differentiate between these two affections.

Finally, although this may perhaps be called 'music of the future,' I myself look forward to the day when further progress in physiological chemistry will enable us to recognize subtle differences in the composition of nerves and muscles. Should that hope be realized, physiological chemistry will perhaps enable us to solve that great problem, which for the last twenty-five years has occupied the minds of so many of us—namely, the cause of the greater proclivity of the abductor fibres of the recurrent laryngeal nerve, and the muscles which they supply, to succumb sooner than the adductors, or even exclusively in cases of organic disease of the roots and trunks of the motor laryngeal nerves.

III. MATHEMATICS, INCLUDING STATISTICS.

Occasionally the resources of mathematics have to be laid under contribution by our specialities. Thus, for instance, it was necessary when I studied some years ago the position of the vocal cords in quiet respiration in man, to correct, when using graduated laryngeal mirrors, the considerable difference between the actual and

the apparent length of the distance measured. This difference could be accurately expressed by a mathematical formula.

Similarly, in a recent paper on the aerodynamics of the respiratory passages, Dr. Gevers, of Leuven, measures mathematically the permeability of the nasal chambers. On the whole, however, it must be confessed that the connection between pure mathematics, and laryngology, otology, and rhinology is only a distant one.

But matters become very different if we look upon the science of statistics as a method of applied mathematics, and consider its employment in our literary work under the present heading.

More and more frequently of late years has the statistical method not merely been laid under contribution, but been allowed to have a decisive vote in questions of the greatest importance for laryngology, otology, and rhinology. It may, therefore, not be out of place to express on this occasion a devout hope that those who employ this method for the decision of controversial points in our own science, should make themselves first acquainted with the general principles of the method itself. The non-observance of this precaution has led in more than one instance, not only to fallacious scientific conclusions, but to deplorable practical results.

I will illustrate this by one example only.

In no chapter within the territory of our own specialities has the statistical method of late years been more frequently used than in that of cancer of the larynx. As a matter of fact, the usefulness or otherwise of the individual operations now practiced for the cure of that terrible disease is judged by most surgeons exclusively on the basis of statistics recording the results of various forms of operation. Unfortunately, however, a good many of those who have compiled such statistics have done so in a most empirical manner. They have simply registered under one and the same heading all operations of one and the same type ever performed without taking into consideration such indispensable distinctions as:

1. The period of our knowledge at which each of these operations was performed.
2. The individual and enormously different conditions present in each of the cases which were subjected to one and the same operation.
3. The progress of the technique of these operations as they gradually developed.

The outcome of this, as will be clear to everybody who has paid any attention to the principle of statistics, has naturally been lamentable. Most valuable forms of operation, such as thyrotomy, have been, and unfortunately still are, persistently discredited, be-

cause some compilers of these statistics will not or cannot see that a thyrotomy performed, say, in 1870, was a thing as different as heaven and earth from a thyrotomy performed in 1904 under altogether different conditions of diagnosis and technique. They accordingly put together all thyrotomies ever performed, without taking these all-important differences into consideration, and calmly proceed to register the net result. The natural outcome of such directly misleading statistics has been that the true value of thyrotomy in suitable cases has not nearly universally enough been recognized at the present moment, and those who have practiced it with excellent results in really suitable cases during the last fifteen years have even at this hour of the day to carry on an uphill fight against those who put their faith blindly in the unsatisfactory sort of statistics just described. The hope may, therefore, be justly reiterated on this occasion that every medical man who wishes to approach a medical question from the statistical point of view should make himself thoroughly acquainted with the standards of his measurements before applying the latter to the question which he intends to study.

IV. METEOROLOGY AND CLIMATOLOGY.

A few words only are requisite at the present state of our knowledge with regard to the connection between meteorology and laryngo-otology. The more we learn of the influence which climatic and meteorological conditions exercise upon certain diseases, the more necessary does it become to study these conditions in order to benefit our patients, and to avoid serious mistakes in sending them to localities which, however suitable in other affections, are not adapted for their particular case. This general rule applied to our specialities comes particularly into force with regard to laryngeal tuberculosis and to middle-ear catarrh. With regard to the former, I need simply mention that at present the opinions as to the suitability or otherwise of high altitudes in cases of laryngeal complications of pulmonary tuberculosis are extremely divided; with regard to middle-ear catarrh, one sees it frequently stated that seaside places exercise a distinctly unfavorable influence upon them. But the relation of meteorology and climatology to our branches is certainly a wider one than indicated in the foregoing illustrations, and well deserves—and will, no doubt, receive—further attention.

V. PHILOSOPHY, LOGIC, HISTORY, AND LITERATURE.

Of the connections of philosophy, logic, history, and literature with laryngology and otology I wish to say a few words jointly, because their relations to our specialities are similar in kind. They are not of that palpable and, if I may say so, tangential character,

as those of physics, chemistry, and mathematics, and of the other branches of human intellectual activity to be touched upon hereafter, in that it is impossible to name individual distinct points in which their achievements touch equally distinct and individual points of specific interest for us. But, although more subtle, their relations with the higher aspects of our work are no less intimate, and additionally, if I may say so, are all-pervading. The specialist who is endowed with a philosophical turn of mind will look upon his own work and upon the interests of his speciality from a much broader point of view than the man whose horizon is obscured by the limited and more or less narrow-minded doctrines of one individual school of thought. He will not be swayed by the fashionable currents of the moment, and will be consoled when he sees that not only the public but many within the ranks of his own confraternity periodically lose their heads over the latest sensational development, destined in the opinion of its creator and its disciples to bring about in our own times the millennium, by the remembrance of Ben Akiba's immortal dictum:

"Alles schon dagewesen (Nothing new under the sun)," and by the reflection that in all probability in a very few years the same faithful ones will bow down and worship another golden calf. The man who has learned to think logically will not be caught, when he writes a paper, in glaring self-contradictions, and will carry when following a chain of thoughts, that chain to its only possible conclusion. The author who does not confine his literary studies to the reading of exclusively medical productions, who has been brought up with a knowledge of all that is good in the literary productions of former as well as of our own times, and who has a warm heart for poetical and literary beauties in the literature of all nations, will make his own work attractive to readers, and will know how to give clear expression even to abstruse scientific questions. And, in conclusion, the laryngologist and otologist, who knows something of history in general and of the history of the development of his own speciality in particular, will have an infinitely higher standard of comparison of the achievements of the present day with those of our predecessors than the man for whom all that has been published ten years ago is merely "ancient history" not worth reading. Above all, he will have learned from the lessons of the past the one great truth that, however important a discovery he may imagine to have made, it behooves him to be modest in the face of what has been done before him.

It is extremely tempting to illustrate what I have just said by reference to the writings of some of our *confrères*, whose scientific

productions are distinguished by literary charm, by limpidness of expression, by inexorable logic of thought and by profound knowledge of the history and literature of other subjects, but, apart from the question of the length of this address, which hangs over me like the sword of Damocles, the task, although enticing, would be somewhat invidious. Still, I hope that nobody will grudge it, if before leaving this part of my task, I refer with admiration to the work done by two American specialists, and illustrating the truth of what I have just said, namely, the excellent historical and literary researches of Dr. John Mackenzie, of Baltimore, which give quite a special *cachet* to several of his papers, and the recent magnificent medical history of laryngology and rhinology by Dr. Jonathan Wright, which, owing to a most unusual combination of all the philosophical, literary, and historical qualities of which I have spoken will, I feel sure, ever remain a classic in the literature of our specialties.

VI. TECHNOLOGY.

A few words must suffice to remind you of the great importance of every technological progress for those whose special practice lies in the treatment of throat, nose, and ear diseases. From year to year these specialties tend more and more to become branches of surgery, and the question of their surgical equipment therefore is constantly with us. Most of our instruments are no doubt invented by specialists themselves, but in not a few cases we are only able to give a leading idea to the instrument maker, and the success or otherwise of our idea depends upon the constructive talent of the latter. Nor is it rare that patients themselves devise improvements of existing instruments and apparatus. Thus, for instance, the most ingenious, and at the same time simplest, speaking apparatus which I have ever seen, used by patients condemned to wear for a time or for ever a tracheal cannula, was constructed by a watchmaker who had the misfortune of himself belonging to the class of patients in question. A glance at the innumerable "modifications" of instruments now in general use recommended in the catalogues of various instrument makers shows the intimacy and importance of our relations with technology, and I desire in conclusion of this reference only to remind you of the quiet revolution that has been going on in our tools of late years in proportion to the greatly-increased importance of aseptic surgery, and in the course of which it has become the aim to have all our instruments fashioned out of metal, and to banish wood entirely.

VII. MUSIC.

Next we come to a most fascinating subject—the relation of the noble art of music to laryngo-rhino-otology. Of the intimacy of this relation there can be no possible doubt; without what is called a “musical ear” music is an impossibility altogether; without the possession of a healthy larynx, singing cannot be thought of. When I speak of a “musical ear” I mean, of course, the control exercised by the ear over the technique of executants; that music in its highest forms is completely, or at any rate nearly, independent of the power of hearing has been shown by nothing more conclusively than by the case of deaf composers, whose “inner voice,” to speak with Robert Schumann, elevated them beyond the apparently-indispensable faculty of hearing. Beethoven was deaf when he wrote the Ninth Symphony, and nothing more pathetic surely can be imagined than, when his audience after its first performance rose to an indescribable pitch of enthusiasm, one of the singers had to turn the deaf Maestro round in his chair to see—what, alas, he could hear no longer—the applause with which the public of Vienna greeted this, probably the greatest musical composition of all times. But even in this exceptional case the close relationship of the art of music with the physical faculties of sound and hearing is characteristically illustrated. If the musical ear had come to the great composer’s help in the final chorus, I cannot imagine that he would have written the soprano parts as he has done—too high to be reached without great effort by the voice, and not pleasing in its effect to the tympanum of the ordinary listener.

As to the connection of laryngology with singing, no more significant testimony could surely be adduced than the fact that the laryngoscope, upon which modern laryngology is based, has been the invention, not of a medical man, but of a singer, the venerable Senor Manuel Garcia, who has been spared by a merciful Providence to live in undimmed possession of all his mental and physical powers to the patriarchal age of 100, and whose 100th birthday we hope (D.V.) to celebrate in March of next year. The auspicious event will coincide, I may remark, with the jubilee of laryngology, his epoch-making paper, entitled *Physiological Observations on the Human Voice*, which he submitted to the Royal Society of London in 1854, having been published in the *Proceedings* of that Society (vol. xii, No. 13) in 1855. Garcia was led to his discovery by the natural desire of an intelligent singer to study the physiological properties of that most wonderful of all instruments, the human voice, by direct inspection of its constituent parts during the act of

singing. Ever since manifold endeavors have been made to let the art of singing profit by the revelations given by the laryngoscope. Candor, however, compels me to say that these efforts have hitherto been less successful than one might naturally have expected. Pretensions have been, and are being, made as to the claim of the laryngoscope to lay down the law concerning most intricate questions arising in the production of the singing voice; but, as I have stated on a previous occasion, there exists no "superior wisdom" based upon laryngoscopic observations with regard to the teaching of singing. Now, as in bygone days, the teacher who founds his instruction upon the classical traditions of the art of singing, and who individualizes in every case entrusted to his care, will certainly be more successful than the theorist who, starting from preconceived notions, the correctness of which is anything but proven, forces the natural mechanism of his pupils' voices into his unbending formula, and thereby, in not a few instances, ruins them.

This warning is of course not intended in any way to deter both laryngologists and singing masters from joining forces in determining questions regarding the physiology of the voice, and recent work, such as that of Holbrook Curtis, Flatau, Bukofzer, and Imhofer shows how valuable the laryngologist's aid may be in assisting the task of the teacher of singing in such questions as, for example, the method of intonation—a point in which science and art very nearly touch one another. Future anatomical and physiological researches will have to solve the fascinating questions of the mutual inter-dependency of the centers and paths of audition and sound in the brain. The data at present at our disposal are not sufficient to fully understand through what kind of afferent and efferent fibres impressions are conveyed to and from these centers; how they are changed into volitional impulses, and how they produce the desired note of the voice.

For the purposes of this address the foregoing short remarks will, I trust, suffice to show that no better illustration of the mutual relationship of most various arts and sciences could be imagined than in the territory of music, and more particularly of singing. That noble art is inseparably interwoven with laryngology, otology rhinology—for the accessory cavities of the nose are serving as resonators for the sounds produced in the larynx—anatomy, physiology, and physics.

VIII. BIOLOGY.

If we consider the relation of our branches to biology—excluding from the generic term thus used human anatomy and physiology—the same remark applies to their connection which I just used when

speaking of the relation of music to our specialities; more might be expected from the future than has been achieved in the past. No doubt the study of comparative anatomy and physiology, particularly the developmental part of these sciences, has been very useful in making us understand the origin, the gradual development, and final composition of the complicated organs, with which we have to deal, and in not a few questions—more particularly in those relating to the nervous mechanism of the larynx—the lessons derived from experimental physiology have already been of the greatest importance in helping to solve the difficult problems with which we have to deal. Still, I am in no fear of contradiction when I say that a great deal more may be expected for the elucidation of many difficult questions with which we are confronted in laryngo-oto-rhinology from further biological studies.

IX. MEDICINE.

Finally—and, though last, not least—I have to discuss the relations of laryngo-oto-rhinology with other branches of our great mother science, Medicine. The subject is one so large that, to do it justice, not one but a course of lectures would be required. At every step the specialist whose mind is open is reminded of the close connection of his limited field of achievement with other branches of medical art and science.

Anatomy, Physiology, Pathology.—He can do no good without an intimate knowledge of the anatomy of the organs entrusted to his care, and of their anatomical relations to adjoining and even more distant parts. In order to understand morbid conditions of the nose, throat, and ear, he must be thoroughly acquainted with the action of these organs in health, in other words, with their physiology. Wherever clinical observation is insufficient or at fault, he can appeal to no better helpmate than to the researches of pathological anatomy, and it may be truly stated that the conviction of this intimate association with the three sciences named is becoming more and more alive in our minds. We no longer leave the investigation of anatomical, physiological, and pathological problems pertaining to our specialities exclusively in the hands of professors of these branches; a large number of very valuable contributions towards the elucidation of such problems has been made of late years by members of our own specialities, and in not an inconsiderable number of instances the co-operation between laryngologists, rhinologists, and otologists with pure anatomists, physiologists, and pathologists has been productive of most valuable scientific results.

It suffices to mention the anatomical work of B. Fraenkel and his school, of Broeckaert, Onodi, Paul Heymann, Elsberg, Carl Seiler, Körner, Jelenffy, Killian, Politzer, Gruber, Urban Pritchard, Tilley, Logan Turner, Kanthack, Seifert, Siebenmann, Gougenheim, and Lermoyez; the physiological researches of Schech, Grabower, H. Krause, Katzenstein, Klemperer, Fraenkel, Hooper, Bryson Delavan, Frank Donaldson, jun., Desvernine, Réthi, Hajek, Zwaardemaker, Greville MacDonald; the pathological studies of Heinze, Grünwald, Kuttner, Seifert, Kahn, Heryng, and Butlin, and the joint work of B. Fraenkel and Gad, of Bowditch and Donaldson, of von Mering and Zuntz, of Mikuliez and Michelson, to which I hope I may add the researches undertaken by Victor Horsley and myself—to show that the above statements are not mere assertions, but based upon solid facts. On the other hand, we gratefully recognize the most important help that has come of late years to the aid of laryngological knowledge from such distinguished anatomists, physiologists, and pathologists as Luschka, Sappey, Zuckerkandl, Exner, Hermann Munk, Richard Ewald, Risien Russell, Bechterew, and others. And yet these are, I particularly wish to state, a few names only taken at random from one's recollection of those who have enormously improved our knowledge of the anatomy, physiology, and morbid histology of the throat, nose, and ear, within the last twenty years.

Bacteriology.—From pathological anatomy in general, there is but one step to the latest development of that science, bacteriology. Here again the close relationship of our specialties to this new science is evident everywhere. We learn from the bacteriological examination of the sputum in cases in which the clinical examination of the nose, pharynx, larynx, or ear, leaves it doubtful whether we have to do with tuberculosis, the true nature of the process that engages our attention; we differentiate with the help of bacteriological examination between true diphtheria, Vincent's angina, and other forms of septic inflammations of the cavities of the mouth and throat; the employment of antitoxin enables us to deal infinitely more effectively than at any previous state of our knowledge with that scourge of humanity, diphtheria; we ascertain in those terrible, although fortunately rare cases, which I have grouped together under the name of "Acute Septic Inflammations of the Throat and Neck," the nature of the particular pathogenic micro-organism that is causing the disease in a given case, and although as yet by no means masters of the situation, we succeed in a certain number of these cases, namely, in those in which the streptococcus is producing the septic inflammation, in warding off by the employment of antistreptococcus-serum the otherwise unavoidable fatal issue. As a matter of fact,

an almost unlimited vista of further progress has dawned for our specialities in a number of previously most intractable affections from the rise and progress of bacteriology.

Internal Medicine.—On the connection of laryngology, rhinology, and otology with internal medicine, it is practically unnecessary to dwell. Whilst there is, needless to say, a number of local diseases of these organs strictly limited to them, in another large and important number, the affection for which the aid of the specialist is sought is only part and parcel of a systemic disease, and, as I have endeavored to show on another occasion, it would seem high time that not only the public, which has rushed to the conclusion that all affections of the throat, nose, and ear ought to be treated locally, but also some enthusiastic specialists should come to understand that in such cases not so much local as constitutional treatment is indicated. There are numbers of cases of general anæmia, of periodical disturbance of the circulation, of general plethora, of nervous irritability, of gout, in which, without any actual changes existing in the throat, nose, or ear, unpleasant sensations are experienced in these parts, which can only be effectually treated by attending to the systemic conditions which underlie these local sensations. On the other hand, actual organic lesions occurring in these parts often enough are of the greatest importance for the diagnosis and proper treatment of grave general diseases. To give but a few examples: paralysis of one vocal cord may for a long time be the only actual sign discoverable, with the means at present at our command, of aneurysm of the aorta, or of other mediastinal tumors, of affections in the posterior cavity of the skull, of pleuritic thickening of the apex of the right lung, of cancer of the gullet, and a host of other grave organic affections; certain laryngoscopic appearances may enable us to diagnose the existence of pulmonary tuberculosis at a time when all other signs fail; Killian's bronchoscopy, one of the most valuable modern additions to our diagnostic and therapeutic equipment permits us to remove foreign bodies from the interior of even smaller bronchial tubes—chronic obstruction of the nose undoubtedly exercises a very unfavorable influence upon the general health, a fact which is most clearly demonstrated by the surprising improvement of well-being which follows removal of adenoid vegetations in much-developed cases—a cerebral abscess is nowadays known to be much more frequently due than was suspected only a few years ago to diseases of the middle ear and mastoid process, and has become infinitely more accessible to treatment than one could venture to hope in previous times. I may further remind you of the frequency with which the throat, nose, and ear are affected in infectious diseases,

such as measles, scarlet fever, smallpox, typhoid, and influenza; again, of the manifestations of gout, rheumatism, and syphilis in these parts, and this list could be easily extended. The above examples, however, will suffice, I hope, to show the intimacy of the relations between our specialities and internal medicine.

Surgery.—If I just said that it was almost superfluous to insist on the intimacy of our relations with internal medicine, this certainly applies in an even higher degree to their connection with surgery, for indeed they are daily becoming more and more branches of surgery itself. I have on another occasion stated my own conviction, that it is in the nature of things when a part of the human body has been made more accessible to eye and hand by the progress of science, that the treatment of affections of that part should gradually change from the medical to the surgical side. So much has this been the case of late with regard to the development of laryngology, otology, and rhinology, that if there be any danger in its further progress it would certainly not be in the direction of under-rating, but of over-emphasizing the idea that the existence of an affection of the ear, nose, and throat must be invariably associated with the idea of surgical interference. However, this is a subject on which I have no wish to dwell again on this occasion, and I much rather recognize the brilliant progress made of late years—and, I may proudly add, mostly by specialists—in the surgical treatment of the early stages of laryngeal cancer by thyrotomy, of affections of the accessory cavities, and of deviations of the septum, of the nose, in the radical treatment of mastoid disease, and in the removal of foreign bodies from the bronchi and œsophagus. All these achievements belong to the veritable triumphs of contemporaneous surgery.

Children's Diseases.—The large proportion of children seen in the out-patients' room and at the private consultations of specialists for throat, nose, and ear affections bears eloquent testimony to the close association between diseases peculiar to childhood and affections of the auditory and upper respiratory tract. Here, of course, in the first place, adenoid vegetations and their far-reaching influence upon general development have to be mentioned, an influence of which it may only be devoutly hoped that it should not be overstated. But there are additionally the infectious diseases of childhood, in the course of which complications on the part of the ears, the throat, and the nose play a large role. It is pleasant to note how much more attention is paid to the condition of the upper respiratory tract, and the ears of children by government and public health officers than was the case only a few years ago, and to read of the increased frequency of the examination of school children with regard to their hearing

and breathing powers in different countries of the world. That is certainly the proper way to promote the health of the community.

Ophthalmology.—Whilst in this country for a number of years the specialistic treatment of affections of the throat, ear, and nose has frequently been combined in one hand, both in private practice and in hospitals, it is only comparatively recently that attention has been more prominently directed towards the close association of affections of the eyes and nose. The pioneer in this direction has undoubtedly been Dr. Ziem, of Danzig. But much has been learned regarding the importance of this connection since he published his first paper about twenty years ago. The reader who has not himself worked on the subject will be surprised to learn from the recent brilliant contribution to this question from the pen of Professor Schmiegelow, of Copenhagen, how much more has been done in this field since Ziem's first investigations were published and how much more remains to be done.

Dermatology and Syphilitic Diseases.—Here again the close connection between manifestations on the external integument and similar ones on the mucous membranes is a well-established fact. The chapter on syphilis of the throat, nose, and ear is one of the most important in our field, and the possibility of syphilis must be always kept in view in the event of our meeting with any obscure affection. On the other hand, eruptions on the mucous membranes of the pharynx, nose, and larynx not only accompany in a number of cases analogous skin affections, but may precede such external manifestations, or even remain for a long time limited to the mucous coverings. Thus lupus, herpes, pemphigus, lichen, and a host of other eruptions sometimes occur first in the parts entrusted to our care, and may baffle the specialist whose knowledge of skin diseases is limited.

Neurology and Mental Diseases.—When discussing the relations of our specialities with internal medicine I have already incidentally mentioned the significance of laryngeal paralysis for the diagnosis of some of the gravest intrathoracic diseases. It is, however, not only in connection with these, but with numerous affections of the central nervous system that laryngology is of the greatest importance for neurology. The discovery of a laryngeal paralysis may be for a long time the first sign of the existence of organic central nervous disease, and in no affection is this more clearly shown than in tabes dorsalis. Again, neuroses of the olfactory nerve not rarely accompany important intracranial affections. Thus anosmia may occur in hysteria, basilar meningitis, and locomotor ataxy, and parosmia may be met with in hysteria, epilepsy, hypochondriasis, or may precede mental disturbances of an even graver character. Affections of the inner ear and of the auditory nerve occur in many diseases of the central nervous system. Auditory hallucinations, such as the hearing of voices, may accompany, or even usher in, different forms of insanity, and symptoms of Menière's disease probably come as

often under the observation of the neurologist as of that of the aurist.

I forbear from entering upon a further enumeration of the branches of medicine with which our specialities have points of interest in common. My list is by no means exhausted, and I may, as a proof of this, remind you of the connection between them and dentistry, the point of contact being the affections of the antrum of Highmore, but in truth it may be said that there is hardly one single branch of medicine which does not occasionally come into touch with laryngological, rhinological, or otological interests.

In conclusion, I should have liked to dwell upon the relations of the three specialities to one another, a question on which I hold views of my own. But, apart from the need of keeping my own observations within the limits of the time specified, it would be out of place to introduce controversial matters into an address of this kind; and, further, I have on more than one previous occasion stated my opinions on this most important topic as clearly as I could.

And now, gentlemen, that I am at the end of my task let me say that nobody could be more painfully conscious than I am how incompletely I have fulfilled it. I had intended to bring before you a picture full of life, and on looking back I have to confess to myself that I have offered you little more than a framework, the details of which must be filled by your own knowledge and imagination. I had hoped to give you chapter and verse for every statement I have made, and I see that my paper is little more than a sort of catalogue, under the headings of which only indications but no elaborations could be given.

But, whilst unreservedly recognizing these shortcomings, I trust I may justly plead that the subject confided to me is one of such magnitude that, within the limit of time necessarily imposed upon me, it was well-nigh impossible to do full justice to it. Yet, incomplete as my exposition has been, I venture to hope that it has illustrated, by the demonstration of the intimate connection of laryngology, otology, and rhinology with human activity in so many other branches of Art and Science, the truth of Goethe's immortal dictum:

"Truly the fabric of mental fleece
Resembles a weaver's masterpiece,
Where a thousand threads one treadle throws,
Where fly the shuttles hither and thither,
Unseen the threads are knit together,
And an infinite combination grows;"

and that it has more than justified the warning words of my great teacher Virchow, which I have quoted at the beginning of this address:

That no speciality can flourish which separates itself completely from the general body of Science; that no speciality can develop usefully and beneficially if it does not ever and ever again drink from the general fount, if it does not remain in relationship with other specialities, so that we all help one another, and thereby preserve for Science, at any rate, even if it should not be necessary for Practice, that unity on which our position rests intrinsically, and, I may well say also, with regard to the outer world.

THE ETIOLOGY AND DIAGNOSIS OF OZENA AND ITS RELATION TO PULMONARY TUBERCULOSIS.*

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In the Jubilee Number of the *Albany Medical Annals*, January, 1904, the writer published a short preliminary report of his observations, extending over several years, as to the etiology and diagnosis of ozena and its relation to pulmonary tuberculosis. In this paper the cases reported, 21 in all, which have since then been more thoroughly studied, will be briefly reviewed, and a further report of 19 cases will be given, 40 in all. These were all genuine ozena cases in which the usual symptom complex, on which the diagnosis of ozena depends,—i. e., the presence of decomposing, foul-smelling secretions, and the atrophy of the mucous membrane, was present. In this paper, this view of the diagnosis will be taken, whatever the origin of the crusts may be. The etiology will be considered, particularly with reference to disease of the accessory cavities, and a history of infectious diseases, like measles, scarlet fever, and diphtheria.

The first report as stated, gave the results of a study of 21 cases. In eight of these, positive evidence of sinus disease existed. A more thorough study of these eight cases, has brought out the fact, that in four, chronic antral empyema, (in two combined with chronic ethmoiditis), existed. In two of these cases, the ozena was bilateral and in two unilateral, the sinus disease existing on the same side. In my first report, the ethmoiditis, in the two cases just mentioned, was overlooked, and was not discovered until a portion of the middle turbinate was removed, and the ethmoid cells were explored.

In three cases, (two of bilateral and one of unilateral ozena), ethmoiditis alone existed, and in one case, chronic frontal sinusitis and ethmoiditis.

In the second series of 19 cases, accessory sinus disease was only discovered in three, in marked contrast to the first series of cases.

In one case, the ethmoiditis existed alone, in one, it was combined with empyema of the maxillary antrum, and in one, disease of the sphenoidal sinuses and ethmoid cells, was found. The ozena, in the case in which the ethmoiditis and maxillary sinusitis were present,

*Read at the Twenty-sixth Annual Congress of the American Laryngological Association, Atlantic City, N. J., June 2, 3 and 4, 1904.

was unilateral, and on the same side as the sinus disease. In the other two cases, the ozena was bilateral, as was the ethmoiditis.

We have then, eleven cases of accessory sinus disease out of 40 ozena cases, or about 25 per cent.

The methods used in arriving at these results were briefly as follows: In every case a thorough investigation of the accessible sinuses was made. The nostrils, of each patient examined, were first freed of crusts and other secretions in the usual way, and then trans-illumination with a lamp of high candle power (that of Chevalier Jackson) was employed. (The writer has since come to the conclusion that the candle power of this lamp is too high.) This method did not prove reliable in making a diagnosis of the sinus disease, except in two of the cases in which empyema of the maxillary antrum existed.

After the nostrils were thoroughly cleansed, the maxillary antra, in all cases in which the patient's consent could be obtained, were punctured in the usual manner through the nose, and washed out.

This test was employed in nearly all the cases. In the cases in which it was found that disease of the antrum existed, foul-smelling pus and other secretions were washed out.

The frontal sinuses were also washed out in as many of the cases as possible.

In seven of the cases in which a diagnosis of ethmoiditis had been made, operations, consisting of a removal of a portion of the middle turbinate and curettage of the ethmoid cells, were performed, and the diagnosis was made in this way.

In the ninth case, in which ethmoid disease had been diagnosed, the large sequestrum which I have here, was removed, after freeing the nose of crusts. It represents part of the left lateral ethmoid mass. The bone was decidedly necrotic, and there had been a purulent discharge from the ethmoid cells. The cells were filled with a thick foul-smelling secretion. This patient was probably a syphilitic subject.

In the tenth case, the ethmoid cells could be entered without removing any of the middle turbinate, as the bone itself was atrophied and necrotic. The sphenoidal sinuses were also diseased in this case.

In the last two cases, syphilis was probably an etiological factor, but in both, the ethmoid cells contained decomposing foul-smelling secretions.

I will not give a full report of every case in which sinus disease was discovered, but it may be of interest to consider more fully a few of the individual cases. In one a radical operation for the cure

of a chronic frontal sinusitis was performed and subsequently the sinus was repeatedly washed out through the nose.

This was one of the cases of unilateral ozena existing on the same side as the sinus disease, and the characteristic odor and decomposing crusts were present. While this patient was under my observation, decided improvement of the nasal condition followed the operation and irrigations of the sinus, the odor as well as the offensive secretions being much lessened.

In another case, that of Miss S., aged 30 years, whom the writer has had under observation for eight years, a bilateral ozena and ethmoiditis existed. Several operations for the relief of the ethmoid disease have been performed, with the result, that the crust formation and odor have practically disappeared. This patient only rarely comes for treatment at the present time.

The argument may be advanced that such cases, in which accessory sinus disease is present, are not cases of genuine ozena, that the nasal conditions are merely accompanying symptoms of the sinus disease. If we accept the meaning of the term ozena as correct, however, then we must call every case, in which the characteristic symptoms, the odor, the formation of crusts and other decomposing, foul-smelling secretions, and the atrophy of the membrane, are present, ozena, whatever the cause of the crust formation may be. I have purposely not used the term atrophic rhinitis in the title of my paper, because there are many cases to which the term rhinitis atrophica simplex might be applied, in which all the characteristic symptoms of an ozena, complicating sinus disease are not present. This form of the disease perhaps occasionally follows hypertrophic rhinitis.

In this form, in the writers experience, the crusts are often thinner, dryer, and more tenacious, than the thick, soft, foul-smelling crusts of an ozena accompanying sinus disease. The odor, in the cases, in which sinus disease is present, is, as a rule, even more offensive than in the uncomplicated cases of atrophic rhinitis, and is probably directly due to the decomposing secretions in the diseased sinuses, and need not be explained by the presence of some specific bacillus.

I must confess that if the nasal condition, that was present in the eleven cases I have just reported, in which sinus disease was present, is not ozena, I am unable to differentiate it from ozena. The nasal secretion and crusts from a number of cases were examined in the laboratory of the Troy Hospital by Dr. Dickson, and with the exception of the usual cocci, no distinctive bacilli were found.

I would like briefly to give the history of another of these cases of rather unusual interest: G. H., a boy, aged nine years, suffered

from an attack of nasal diphtheria four years ago. His mother, who contracted the disease from him, stated that from the time he had diphtheria, he had suffered from occlusion of the nostrils and an offensive yellowish discharge. His nose had been perfectly well before his attack of diphtheria. At the time he came under my observation, September 30, 1903, he had an apparently typical bilateral ozena, with atrophy of the membrane and the unmistakable odor. Both nostrils were filled with enormous soft muco-purulent crusts. When these were removed, pus could be seen in the middle meatal region of both nostrils, and was found to come from the maxillary antra.

Cultures were taken from both nostrils sent to the Bender Laboratory in Albany and examined by Drs. Pearce and Winnie, who reported that they showed the presence of typical diphtheria bacilli in conjunction with an organism that was probably Friedländer's bacillus mucosus capsulatus. The interesting feature in this case is the fact, that injections of antitoxine caused a rapid disappearance of the crusts, in fact practically cured the nasal condition. The bacilli were still present when cultures were taken four months ago, but their non-virulence was proved by inoculating guinea pigs with pure cultures of the diphtheria bacillus obtained from the nose. The pigs all remained well, none showing any reaction. I thought at first that this case was one of membranous rhinitis, but if it was, it was not possible to differentiate it from ozena.

The case brings out the interesting etiological point that the infectious disease the boy had suffered from four years ago probably caused his antral empyema and ozena, and brings us to a consideration of the infectious diseases as causes of sinusitis, and so later on ozena.

One of the popular theories concerning the etiology of ozena, is that it sometimes follows cases of "purulent rhinitis of childhood."

While the so-called purulent rhinitis of childhood, may occasionally be a condition per se, the writer is of the opinion, that many of these cases are cases of sinus disease following certain infectious disease like measles, scarlet fever, and diphtheria. This would of course account for the purulent discharge from the nose that the children have, and if the sinus disease was not recognized as it frequently is not, there is no reason why the constant discharge from the diseased sinuses, would not finally, later in life produce an atrophy of the membrane and ozena. This of course will not explain why in certain cases of purulent sinusitis, polypi and exuberant masses of granulation tissue occur, while in other cases atrophy of

the membrane and ozena result. The writer is of the opinion that granulations are more apt to occur when caries exists.

Then too, we must consider that a patient who has had an ozena from childhood may develop later in life a sinusitis, and the impression would be gained that the ozena was secondary to the sinus disease.

It has been demonstrated by a number of writers, among others, Emil Mayer and Pearce⁹ that sinus disease may occur very early in life. Pearce's investigations are of particular interest in considering a subject of this kind, because they show the frequency of accessory sinus disease complicating diphtheria and scarlet fever in children. Pearce examined the accessory sinuses, particularly the antra, of 50 patients who had died of diphtheria or scarlet fever, in the Boston City Hospital. The heads were so sectioned that easy access to the accessory sinuses could be obtained. Thirty-nine cases of diphtheria were examined, and in 25 inflammatory changes in the accessory sinuses were found, i. e., both antra in 16, both antra, sphenoidal and ethmoidal sinuses in two, one antrum only in five, and the sphenoidal sinus only in two. Of the 18 double antrum cases, the exudate on both sides, in three, was a thick yellow pus, in three, a purulent fluid with membrane, and in one a cloudy serous fluid with membrane. Five cases of diphtheria with scarlet fever were examined, and in two, changes in the antra were found. Of these two, one was unilateral and contained a thick yellow pus. Two cases of diphtheria with measles were examined, and both antra in each case contained a seropurulent fluid. Four cases of scarlet fever were examined; one antrum was normal, in one case there was a double empyema, and in another, both antra and the sphenoidal sinus, contained greenish pus. The fact that cultures from the sinuses showed the presence of the diphtheria bacillus, which in some of the cases on record persisted for months, and even several years, is of great interest, because it is probable that sinuses so infected would *not* get well until their contents were thoroughly evacuated, and the bacilli finally removed by repeated and long continued douching with strong antiseptic solutions. So that if the condition is not recognized, the constant discharge from the sinuses during a long period might finally produce an ozena. Another interesting point in connection with our subject is this, that Pearce's investigations prove that very young children, in whom the sinuses are but slightly developed, as was the case in many of the cases reported by him, may have a sinus empyema following certain acute infectious diseases, and this, as has been shown, may persist for an indefinite period. This then also proves the fallacy of the theory advanced by some authors, that cases

of ozæna reported in young children, could not be secondary to sinus empyema because the accessory sinuses did not exist in very young children, and the probable truth of Grünwald's³ theory, that a certain percentage of ozæna cases are secondary to accessory sinus disease. It is probable, in view of the positive results of Pearce's investigations, that a large percentage of children, who have had infectious diseases, have as a result a purulent sinusitis which may be recognized for a long time, and may finally produce the characteristic changes in the nasal mucous membrane.

The main supporters of the "Herd" theory for the origin of ozæna are Michel,² Grünwald,³ Löhnberg,⁶ Hajek,⁷ Luc and Bresgen. Michel and Grünwald believe that a considerable percentage of ozæna cases are caused by purulent processes in the accessory cavities. Grünwald formerly was of the opinion that sinus suppuration existed in practically all cases of ozæna, but has since modified his views somewhat. Löhnberg, who at the present time is perhaps the most enthusiastic advocate of the "Herd" theory, goes so far as to state, that he found the accessory cavities diseased in every one of 79 ozæna cases, i. e., 24 times an empyema of the sphenoidal sinus, six times of the frontal sinus, ten times of the ethmoid cells and 39 times of the maxillary antrum. This is certainly a strong argument in favor of this theory.

Alexander,⁸ however, who has also recently published a paper on the diagnosis of ozæna and its relation to pulmonary tuberculosis, quotes the investigations of other authors, who reported 22 autopsies of ozæna cases. Affections of the accessory sinuses were only present in eight of these 22 cases. It is rather difficult to reconcile these findings with Löhnberg's statements. I will merely mention some of the other theories concerning the origin of ozæna, particularly the crust formation and odor. Abel,⁴ Löwenberg,⁵ Perez,¹⁰ Massei, Luc, Thost, Marano, and Klamann, are all advocates of the so-called infection theory, and Abel,¹¹ Löwenberg, Paulsen,¹² and Perez,¹⁰ believe, that certain bacilli, that they found in ozæna cases were responsible for the odor. Abel called his bacillus the "bacillus mucosus," and claimed that he was able to produce in animals with cultures of his bacillus, the same atrophic nasal process that occurs in man.

Perez gave to the organism he found in ozæna cases the name "Bacillus fetidus ozænae," and Paulsen called his the "Bacillus mucosa."

Cholewa and Cordes¹² have advanced a plausible theory in attributing the formation of the nasal secretions of ozæna and the changes in the membrane, to a rarefying ostitis of the turbinate

bones, causing secondary disturbances in the circulation and so the changes in the membrane.

Hopmann¹⁴ has made a number of measurements in ozena cases and attributes the atrophy of the membrane mainly to a shortening of the nasal septum.

Siebenmann¹⁵ believes that the formation of the skull, producing very wide nostrils is the main etiological factor.

To return to my own cases. In the other 29 cases no sinus disease could be discovered, but many of the patients gave a history of having had measles, scarlet fever or diphtheria early in life, and the mothers of some of the younger patients told me that they had had after the infectious disease, a yellow discharge from the nose for a long time, so that it is quite possible that some of these patients as well, had suffered from suppurative processes in the accessory cavities which had got well spontaneously. With the exception of the infectious diseases of childhood, no possible etiological factors, (except that four had the characteristic saddle back noses and syphilis was the probable cause in these cases), could be discovered.

The sinuses in most of these 29 cases were also investigated in the manner before mentioned.

The patients were all young adults, 24 being women and girls, and sixteen men, the ages varying from 9 to 35 years.

To come now to a consideration of the relationship between ozena and pulmonary tuberculosis, in the 40 cases considered in this paper, the writer has some interesting and rather startling results to offer.

In the first series of 21 patients, eight were found to have pulmonary tuberculosis, (two of them being also complicated by laryngeal tuberculosis). Of the other 19 cases, six had well marked physical signs of pulmonary tuberculosis, making 14 cases of pulmonary tuberculosis out of 40 ozena cases, certainly a very high percentage.

In nine of these, tubercle bacilli were found in the sputum, and physical signs were present in the lungs. In the other five, physical examination of the lungs was so positive, that a sputum examination was unnecessary. Five of these 14 patients have died of the tuberculous condition while they were under the writer's observation, (two of them being the cases complicated by laryngeal tuberculosis.)

If you will bear with me a moment longer, I would like to give a brief history of one of these cases of rather unusual interest.

Miss A. B., aged 24 years, has a well marked bilateral ozena. No tuberculous family history. Tubercle bacilli were found in the sputum, and there were well marked physical signs of tuberculosis.

A suppurative otitis media, which was found to be tuberculous, bacilli being found in the pus from the middle ear, was also present in this case, and later developed into a mastoiditis, requiring operative interference. Following the mastoiditis, this patient has developed laryngeal tuberculosis. When last seen by the writer, two months ago, the laryngeal tuberculosis was well marked, although the general condition was fair, as she has been taking creosote right along.

Alexander, in his paper already referred to, reported 50 ozena cases—all selected—but irrespective of the fact whether there was a family history of tuberculosis or not. The interesting point was elicited that the majority of the patients in whom lung trouble was present, had no idea of its existence. Twenty-two of these 50 cases, showed positive evidence of pulmonary tuberculosis both on percussion and auscultation. So that nearly half of Alexander's ozena patients had tuberculosis, a larger percentage than in the writer's cases.

It is more than a coincidence that 14 out of 40 ozena patients should have pulmonary tuberculosis, and would point to an etiological relationship. When we consider that in ozena the normal functions of the nose, to warm and moisten the inspired air and to free it from dust and other substances, is absolutely interfered with, we can readily understand how a tendency to tuberculosis may be established. The thin, watery mucus in a normal nose, washes out the dust and bacteria, and the investigations of Hewlitt and StClair Thompson have also shown, that the normal nasal mucus has bactericidal properties. In 80 per cent of the cases examined by them the normal mucus was found absolutely sterile, micro-organism being only found in the nasal vestibule. In ozena, with nose full of thick, foul smelling crusts, the nasal passages certainly cannot be washed out. All inspired substances, which may be filled with bacteria of all kinds, cling to these thick, tenacious crusts, which in many cases consist of nothing more than dried pus from the accessory sinuses; the bacilli find a perfect culture medium, and may later be carried to the throat and lungs. In the words of Alexander, "the nose, or the filter which should protect the body from the bad results of the invasion of micro-organisms, itself becomes a culture medium for these organism, and becomes a permanent source of infection." The following 11 ozena cases are the ones mentioned in my paper in which disease of the accessory sinuses existed. In eight of these cases pulmonary tuberculosis was discovered.

Case 1. Miss C. C., aged 22 years. Has had nasal disease for a long time. No family history of tuberculosis. Patient had scarlet

fever in childhood. States that there is a yellowish discharge from both nostrils after she gets rid of the crusts. On examination both nostrils were filled with crusts, and the characteristic odor was present. Transillumination was negative. The maxillary antra were punctured through the nostrils, and an offensive thick purulent secretion was washed out of the right antrum. Pus could be seen in the middle meatal region after the crusts were removed. On examination of the lungs dullness and a prolonged expiratory murmur were discovered at the left apex. Tubercle bacilli were found in the sputum.

Case 2. Miss H. C., aged 17 years. Diagnosis: Ozena unilateralis (left nostril). Transillumination gave a shadow on the left side, and when the antrum was punctured in the usual way an offensive purulent secretion was washed out. There was a family history of tuberculosis, and on physical examination, dullness on percussion was found at both apices. Patient had diphtheria when eight years old, and has had the nasal trouble since that time.

Case 3. Miss C. K., aged 20 years. Diagnosis: Ozena bilateralis with chronic antral empyema and ethmoiditis. No family history of tuberculosis. Says that she had scarlet fever in childhood, and nasal trouble since then. Both antra were found to be diseased, as well as the ethmoid cells. The antra were punctured and washed out, and portions of the middle turbinates removed, and the ethmoid cells explored.

Case 4. Miss A. G. B., aged 22 years. Diagnosis: Ozena unilateralis (right nostril) with disease of the maxillary antrum and ethmoid cells.

Antrum was punctured and washed out, and after removing anterior part of middle turbinate, the ethmoid cells were explored, and a purulent secretion discovered. No family history of tuberculosis, but tubercle bacilli were found in the sputum. An offensive pus was washed out of the antrum.

Case 5. Miss M. K., aged 28 years. Diagnosis: Ozena bilateralis with unilateral ethmoiditis. Diagnosis made in the usual way after removing a portion of the middle turbinate and curetting the ethmoid cells. An offensive purulent secretion was found. Patient had scarlet fever in childhood, and says that she has had nasal trouble since that time. No history of tuberculosis in the family, but tubercle bacilli were found in sputum, and physical signs at left apex.

Case 6. Miss S. M., aged 30 years. Diagnosis: Ozena bilateralis with bilateral suppurative ethmoiditis. An offensive secretion was found in the ethmoid cells, after removing portions of the middle tur-

binates. No history of tuberculosis in the family, but tubercle bacilli were found in the patient's sputum.

Case 7. Miss H. J., aged 29 years. Diagnosis: Ozena unilateralis (left), with chronic frontal sinusitis and ethmoiditis. A purulent secretion was washed out of the frontal sinus and this condition was also found in the ethmoid cells. Patient had scarlet fever in childhood. A radical operation for the relief of the suppurative frontal sinusitis was performed, which was followed by decided improvement of the nasal condition.

Case 8. A. H., a boy aged nine years. Diagnosis: Ozena bilateralis with bilateral antral disease. Transillumination gave a shadow on one side but not on the other. This is the boy from whose nose diphtheria bacilli were obtained. The case is fully described in my paper.

Case 9. Mr. M. H., aged 30 years. Diagnosis: Ozena unilateralis with chronic ethmoiditis. In this case a large sequestrum was removed from the nose and ethmoid disease was discovered. Curettage was performed and an offensive purulent secretion was discovered. Patient had scarlet fever in childhood, but was probably a syphilitic subject.

Case 10. J. S., aged 22 years. Diagnosis: Ozena bilateralis with chronic ethmoiditis and sphenoidal sinusitis. (unilateral). Caries of the ethmoid and anterior wall of the sphenoidal sinus were found in this case. Tubercle bacilli were found in the sputum, although the patient was also probably a syphilitic subject.

Case 11. Miss L. B., aged 30 years. Diagnosis: Ozena bilateralis with chronic suppurative ethmoiditis (left nostril.)

After removing the crusts, some pus was seen in the middle meatal region, and an exploration of the ethmoid cells, after removing the anterior portion of the middle turbinate, showed the presence of ethmoid disease.

CONCLUSIONS.

1. Sinus disease probably causes ozena in a certain percentage of cases, or at least it must be considered a strong predisposing cause.
2. Suppurative processes in the accessory sinuses, as shown by Pearce's investigations, are frequently present in certain of the infectious diseases of childhood, particularly scarlet fever, measles and diphtheria, and for this reason, these infectious diseases must be considered at least possible etiological factors of ozena.
3. That while certain percentage of cases are caused by sinus disease, this is not sufficient to explain the pathogenesis of the whole clinical picture of ozena.
4. The large number of ozena patients having pulmonary tuberculosis, would certainly point to the nasal condition as a strong predisposing cause for the development of the tuberculous condition.

MEDICAL TREATMENT OF LARYNGEAL TUBERCULOSIS WITH SPECIAL REFERENCE TO THE USE OF FORMALIN.*

BY LORENZO B. LOCKARD, M.D., DENVER, COLO.

"Tuberculosis is one of the most frequent diseases of the larynx. It is usually fatal. Very few cases recover."

"Occasionally a case recovers; nearly all die."

These two statements emanating from two eminent laryngologists, the first twelve years ago, the other of recent date epitomizes the old and new prognosis as commonly held and demonstrates with what hopelessness the physician takes up the gauntlet of battle.

Are these statements justifiable today and has a decade of effort warranted nothing more than a mere transposition of words?

In no other disease is a statistical report of so little value for we are dealing not with a process of standard or even fairly equable conditions but with one where each is a law unto itself, yet when we contrast the percentage of recoveries given by Bosworth in 1893—less and 1%—with those quoted by Solly in 1904, computed for Colorado, we see that progress has been real and substantial and that this wide-spread pessimism is illogical.

He says: "Taking the results in laryngeal cases without considering the ultimate fate of the patient, there was permanent arrest of the local disease in 64%; temporary arrest in 5% additional cases in which the tissues again broke down shortly before death. Looking at the ulcerated cases alone, 50% healed permanently, 10% temporarily." Levy, in 1900, reported only 26 deaths in 86 infiltrative cases. Of 60 ulcerative cases 37 grew worse or died and of those without involvement of the epiglottis or aryepiglottic folds, only 10% died or failed to improve.

The present day warrants, I believe, a still more hopeful outlook and my recent experience leads to the belief that more than one-half of the ulcerative cases can be brought under permanent control regardless of the eventual outcome of the pulmonary lesion.

For its treatment no specific is known and the vast number of agents utilized is the most eloquent tribute to their general ineffi-

* Read at the Ninth Annual Meeting of the American Academy of Ophthalmology and Otolaryngology, held at Denver, Colorado, August 24, 25 and 26th 1904.

ciency, and yet the outlook each year becomes more encouraging. What is the explanation of this apparent paradox?

It rests largely with the earlier recognition of the incipient lesions; more universal utilization of the essentials of treatment—local cleanliness, vocal and general rest, establishment of physiologic nasal respiration, open air life under favorable climatic conditions, etc., and to a considerable degree upon the mental attitude of physician and patient.

Believing in its incurability the physician formerly treated these cases in a perfunctory manner, striving after the single goal of euthanasia, while today, with a deep appreciation of the necessity of constant vigilance and supervision and its not infrequent reward, his increased zeal and confidence bring greater success. In the treatment two general lines may be distinguished; the palliative and the curative. At certain points these lines converge, notably in all matters pertaining to nutrition and local and general hygiene, but with the palliative otherwise we have here no concern; its indications, except as to whether they be surgical or medicinal are clear, universally known and met.

In considering the curative treatment one is confronted by an appalling array of remedies each endorsed by some observer as standing pre-eminent. There is no specific, and probably never can be for a disease of such manifold types, but the one which fulfills the greatest number of essential requirements, each in a degree equal to any other substance, approaches nearest the ideal. The requirements common to all lesions are cleansing and bactericidal, and for special conditions, stimulative, absorbent or resolvent, caustic and sedative properties.

In meeting these various indications one remedy stands alone, without an equal in its field of universal usefulness—Formaldehyde.

Preliminary to all treatments, the mucosa must be cleared of tenacious mucous or pus and so maintained, and formalin meets this requirement as successfully as Dobell's or any of the other numerous detergents, and for this purpose may be used in weak solutions ad libitum. At the same time it exerts a more profound antiseptic effect than can be attained with any other substance. A solution as weak as 1 to 100,000 prevents the development of bacteria and it is germicidal in a strength of 1 to 75,000.

A 1 to 10,000 solution arrests the growth of the germs of anthrax, cholera, typhoid and staphylococcus pyogenes aureus, and it is markedly superior to corrosive sublimate in solutions of a strength which can be tolerated.

This property would of itself make it a valuable remedy in the treatment of any tubercular process where it is possible to bring it into direct contact with the involved structures as is the case in laryngitis.

That it is of great value in tuberculosis of other organs there can be no question.

According to Lamarque a 1% solution used in cases of tubercular cystitis stops hæmaturia, relieves pain and lessens the frequency of micturition, when every other remedy has failed.

In tuberculosis of the middle ear, irrigation with weak solutions are more effective than any other single procedure.

As has been shown, formalin is prohibitive to bacterial development in a strength of 1 to 100,000 and positively germicidal in 1 to 75,000, and since we can use in the larynx with perfect safety sprays as strong as 1 to 150, it is conclusive evidence that we attain a considerable germicidal effect, and this action is expended not upon the lining membranes alone but upon the deeper tissues as well, owing to its rather unusual penetrative powers.

In lesions of an ulcerative type lactic acid has long been considered the remedy par excellence but in my experience the stronger solutions of formalin have seemed even more efficacious.

It has all the virtues of the former with one or more peculiarly its own. Severe pain not infrequently follows the applications of strong lactic while formalin solutions of equal potency occasion nothing more than momentary smarting with considerable subsequent anæsthesia. Its great superiority, however, rests in its safety, which makes it feasible for the patient, by home use, to keep up a continuous cleansing, antiseptic and stimulant action, a desideratum of high importance. No other remedy has given me as satisfactory results in this form of the disease and under its influence I have seen many cases completely heal that previously resisted all other remedies. As demonstrating this, I hope to show the following case:

Mr. W. M., æt. 32. In January, 1902, six months after pulmonary tuberculosis was diagnosed, there developed complete aphonia with considerable dysphagia, and two months later, upon his arrival in Denver, he presented the following picture:

Entire epiglottis deeply ulcerated with loss of nearly one-half its substance; ventricular bands so infiltrated as to partially overlap the cords with ulcerations at the most prominent point of each. The left arytenoid twice the normal size and extensively ulcerated. Both cords infiltrated and ulcerated throughout with considerable masses of granulation tissue at their posterior attachments: The interarytenoidal sulcus infiltrated and ulcerated.

Treatment, of which formalin constituted the most important part, was instituted with considerable improvement at the end of three months. At this time I substituted lactic acid with the occasional use of guaiacol with continued retrogression when at the end of eight weeks the use of formalin was resumed. By the following January the ulcerations were healed except for one small spot on the under surface of the epiglottis and the infiltration of the ventricular bands and ary-epiglottic folds had almost disappeared.

At this time I left the city for four months and the patient was under the care of a colleague, who, having no faith in this treatment, used lactic acid and methylene blue. Upon my return the condition was worse than at the first examination and a hopeless prognosis was again made. Under the old treatment, however, the condition rapidly improved and six months later he accepted a position as a retail salesman which he has since uninterruptedly held.

In examining the larynx today, were it not for the distorted epiglottis and slight scarring at several points, one could have no suspicion that it had ever been the seat of tubercular disease.

While fully the equal of lactic in the ulcerative type, it is in the infiltrative cases and especially where vegetations exist, that its chief superiority is manifest. The lactic cannot act through an unbroken membrane and to be effective it must be used in the form of sub-mucous injections of a moderately weak solution, 10 to 20%.

Iodine, ichthyol, resorcin, creasote, menthol in oil and the various phenol combinations, after more or less extended experience, have seemed inferior to either the formalin or lactic and personally I now use the latter, only in exceptional cases.

T. J. Gallaher, one of the pioneers with this method, whose experience with it has been extensive, says: "It is the most satisfactory remedy I have ever used in infiltrative cases."

For a time sub-mucous injections of formalin were tried, but were not found to possess any advantage over the simple rubbings, added proof of its penetrative powers.

When vegetations or infiltrations are localized or excessive, they should be surgically removed provided the general conditions are favorable; but after all the tissue capable of surgical treatment has been dealt with, or primarily in case operative procedures be deemed inadvisable, the frequent use of formalin is generally most effective. That its influence in the reduction of hyperplastic tissues is a direct one was strikingly shown by a recent case of pachydermia laryngis where the continued use of this drug caused gradual shrinking with complete restoration of the voice. This action is likewise shown by

its effect upon áural granulations, whether they be tubercular or simple inflammatory.

It may, under certain conditions, produce some anæsthesia but this power is too slight and unreliable to be depended upon. It has a distinct sedative effect but rarely sufficient to permit the withdrawal of other remedies of this class. It is credited, in so far as I have been able to ascertain, with but one deleterious result; the possible production of local dry gangrene. While the danger of this has been mentioned it must be an accident of extreme rarity, for during a period of more than four years I have used it extensively in an infinite variety of patients and lesions without once seeing any evidence of such a complication.

In only one type of the disease, perichondritis of the arytenoids—has it proved inefficient and I believe all other agents are equally so. Partial resolution may result but where true perichondritis has occurred, not a mere œdema, complete restoration to the normal rarely, if ever, ensues, unless through the medium of surgical procedures. It is in this condition that I have seen the only favorable results from photo-therapy. The use of the concentrated rays of the arc light, as advocated by Freudenthal, has frequently resulted in great lessening of a dysphagia that resisted all other means. This has occurred in many cases but never has there been the slightest change in the appearance of the tissues, its sole action seemingly being one of more or less prolonged anæsthesia.

The effect of the X-Rays has been even more disappointing.

Some time ago I carefully selected a series of cases, representing almost every known stage of the disease, and placed them under the care of various experts in the use of electricity. Some were treated daily, some at longer intervals; various tubes were used and daily laryngeal examinations were made without once seeing evidence of the slightest improvement. Indeed, the effects seemed sometimes unfavorable, the marked reactions causing some increase in the subjective symptoms. In using formalin the key to success is the maintenance of continuous action and it is to the neglect of this, I believe, that the many negative reports may be credited.

In the average case it should be used according to the following method: After thorough cleansing with a one-half per cent solution, and the previous application of cocaine, the parts should each day be vigorously scrubbed with a solution of from three to ten per cent, depending upon the nature of the lesion and the susceptibility of the individual. In addition to these daily treatments the patient should use a spray, about 1 to 250, every three or four hours. The usual

method, according to the literature, is to use the stronger solutions once or twice a week with the use of simple detergents in the interim, thus violating the entire rationale of the treatment.

Formalin should never be used blindly to the exclusion of all other remedies for other substances at certain times and in certain individuals may give better results, and while I have come to consider it the sheet anchor of medicinal treatment and rarely supplant it, it is invariably supplemented by other approved procedures. It is the most satisfactory remedy today not because it fulfills any of the attributes of a specific; not because it is invariably superior to all other agents, and not because it always noticeably decreases the period during which treatment must be maintained, but because of the following facts:

1. It surpasses all other bactericides in solutions of a strength which can be tolerated.
2. In tubercular ulcers it is fully the equal of, and probably superior to, lactic acid.
3. Its effect upon vegetations is prompt and pronounced.
4. In infiltrative cases it is by far the most satisfactory remedy.
5. It possesses some anæsthetic properties.
6. It is the only remedy of the curative class that can with safety be placed in the patient's hands, thus maintaining a continuous cleansing, germicidal and stimulant action.
7. Its field of usefulness comprises all of the varied types of the disease.

1427 Stout Street.

Bullet-wound of the External Auditory Canal—B. CHORONSHITZKY—*Monatsschrift f. Ohrenheilkunde*, Jan., 1904.

The path of the bullet in this case is of interest. It entered the skin above the zygoma, glanced off from this bone and passed through the external auditory canal. It was then deflected by the mastoid and appeared in the neck between the sixth and seventh cervical spines. The drum membrane was not injured.

YANKAUER.

REPORT OF TWO CASES OF LARYNGEAL TUBERCULOSIS OPERATED ON BY THYROTOMY. COMMENTS ON THE OPERATION.*

BY OTTO J. STEIN, M.D., CHICAGO.

CASE ONE.

Personal History. A. M., female, age 22 years; colored, was seen for the first time in November, 1901, at my clinic at the Post-graduate hospital. The patient complained of hoarseness, which had been present since the previous spring during her residence in Colorado. Last winter, one year ago, had quite a severe attack of pneumonia, from which she recovered rapidly. With the advent of spring she first noticed a slight huskiness of the voice which continued for a short time, but instead of the voice improving it became worse, so that she was decidedly hoarse. This hoarseness has been present, with but slight changes, ever since. A slight cough has been present almost from the beginning, but, as the patient expresses it, it seemed to be entirely in the throat.

Family History. The family history seems to be good. Her mother and both her brothers and sisters are all living and in good health. The father died of pneumonia.

Examination of the Patient. The patient presents the appearance of a fairly healthy girl. Her usual weight is 112 pounds, but at present it is about 100 pounds. Aside from her hoarseness she claims to be well and strong. Her temperature is 99.5 degrees F.; pulse, 84. Cough is quite severe and is attended with a profuse expectoration, which looks mainly mucous with a slight admixture of pus, but no blood. There is present neither dysphagia, dysphonia nor dyspnoea. Examination of the nose and pharynx revealed nothing. The mucous membrane of the epiglottis appeared anæmic, while that of the interior of the larynx was congested. The left arytenoid, in the region of the attachment of the vocal cord, presented an irregular like growth that appeared to be more a part of the arytenoid than any growth upon it. Its elevation I estimated about five millimeters, with a base of a spreading or infiltrating character. The surface of this growth was not to all appearances ulcerated, but that part of

* Read at the Ninth Annual Meeting of the American Academy of Ophthalmology and Otolaryngology. Denver, Colo., August 24-26, 1904.

the left vocal cord that had its attachment at this point was very much thickened and slightly ulcerated. This ulceration was superficial and irregular in outline. Both the cord and its arytenoid were hindered in their free movements. The right side of the larynx was normal. The report of the medical department at the hospital as to the condition of the patient's lungs showed no positive evidence of tubercular involvement. The sputum, on repeated examinations, showed no tubercle bacilli.

Diagnosis. The intra-laryngeal picture in this case gave no positive evidence of a tubercular disease. But when studied in connection with her personal history and her general condition little doubt seemed to exist as to the true nature of the trouble. Nevertheless it many times becomes a matter of grave concern to us to establish with confidence and without doubt the absolute diagnosis of malignant and tubercular disease of the larynx. To the inexperienced the diagnosis as given in the average text book is misleading. The presence of tubercle bacilli in the sputum, the pulmonary signs, the local anæmias and the club like infiltration of the arytenoids are so often absent that to rely upon such findings is often disastrous to your diagnosis.

Prognosis. As is well known, the prognosis, as to the ultimate disappearance of the trouble, in most all cases of tubercular involvement of the larynx is poor. The more advanced the condition is the poorer the chances are for relief. In the very early involvement, where the morbid changes are but slight, and the condition is recognized at this time, which it many times is not, and where proper measures are instituted to prevent irritation of the throat, the chances for relief from further trouble are good. The earlier then that the condition is recognized, and the sooner measures are introduced to get rid of existing changes, the surer are we of restoring the parts to normal. This case presented a lesion confined as yet to a limited area on one side of the larynx. The larynx, to the best of evidence, seemed to be the active seat of the trouble at the time. The patient was otherwise in excellent general condition. The lesion itself was so situated and of such a character that any intra-laryngeal effort to completely remove it would necessitate repeated operations. In order, then, to eradicate the condition completely, quickly and with the least amount of trauma to the neighboring parts, the extra-laryngeal route seemed the more practical and effective.

Treatment. The operation of thyrotomy was performed without a preliminary tracheotomy. The thyroid cartilage was divided in the median line with a pair of scissors. Two traction sutures of chromatinized catgut were immediately passed through the two halves of

the cartilage. These were afterwards used to suture the two halves together. Applying cocaine and adrenalin solutions to the interior of the larynx, a pair of long-handled scissors, curved on the flat, were used to quickly excise the diseased area, which included the entire arytenoid and the posterior half of the cord. An effort was made to cut deep and wide so as to circumvent the affected region through healthy tissue. Pure lactic acid was applied to the operated surface. The two halves of the thyroid cartilage were then brought together and tied with the catgut sutures used for traction purpose. The skin wound was closed except over the cricothyroid space, through which a small tracheotomy tube was placed. This tube was removed on the second day.

Granulations around the neck wound troubled us a little, as is quite often the case, but otherwise healing took place satisfactorily. The patient recovered a very fair voice, and her general condition remained good. She took on weight and when seen about a year ago there was no indication of a return of the trouble in the larynx. The operated side had cicatrized nicely.

The tissue removed was reported by the laboratory at the Postgraduate Hospital to be tubercular.

CASE TWO.

Personal History. A young man, W. McK., age 23, occupation, printer, consulted me in October, 1903, through the courtesy of Dr. Alfred Croftan of Chicago. He was referred on account of a cough and hoarseness that had been present, more or less continuously, for three weeks. Four years ago his health apparently was poor, and in August, 1900, he sought medical advice. Without any examination whatsoever his physician, he says, ordered a change in climate. Patient went immediately on a ranch in Arizona, where he remained, with a steady improvement in health until July, 1901, when he returned to Chicago. During the following two years he did not complain of his health at all. The patient is of the slender type of manhood, probably never weighing more than 130 pounds; of a somewhat nervous temperament, with strong sexual desires, which were satisfied in excesses. Examination of the sputum for tubercle bacilli had been made on several occasions with negative findings. No history of hoarseness at that time.

Family History. Negative.

History on First Seeing the Case. He claims to have caught a severe cold three weeks ago, which left him quite hoarse. Since then the hoarseness has been constantly present, associated with a cough. The cough occurs more in spells, which are slight. Physi-

cal examination of the chest was made by Dr. Croftan but nothing suggestive of a tubercular condition was found. These examinations were repeated by Dr. Croftan during the several weeks the patient was under my observation and always found to be identical.

Examination of the Patient by Myself. He is slight of stature, weighs 115 pounds and is anæmic and nervous. Aside from his cough and hoarseness he claims to feel well and strong. Temperature, 99 degrees F.; pulse, 80; expectoration slight in quantity, of a watery nature, streaked with yellow, but no blood, and free of any tubercle bacilli. The hoarseness is not profound, nor is the cough severe. He has neither dyspnoea, dysphagia nor dysphonia. There is slight enlargement of a few lymphatic glands on both sides of the neck. Examination of the nose reveals a septum deflected to the left. His throat is severely sensitive to examination. The pharynx is irritable and reddened. It was necessary to cocaineize the pharynx thoroughly in order to view the larynx. The mucous membrane of the latter was but slightly reddened. The contour of the arytenoids was not distinct owing to a filling-in of the more shallow parts. The right vocal cord was of normal color and appearance, and moved freely. The left cord could not be seen on account of the overlapping of a mass from above which seemed to be the ventricular band. This mass, which appeared to occupy the position of the entire left ventricular band, was deep red in color, of a smooth surface with no sign of ulceration, quite firm, immovable and to all appearances an infiltrate of the entire band. During the following few days, while keeping the patient under observation, two small spot like ulcerations appeared on the surface at the posterior end. This was the only ulceration that at any time was apparent to my examinations.

Diagnosis. On account of the lack of any positive physical findings of tuberculosis, the possibility of malignancy had to be considered. From its appearance alone, the mass in the left ventricular region, may have been either of malignant or tubercular character. The infiltrating character of the mass, shown by the interference with the free motion of the cord, suggested a malignancy. The involvement of the entire ventricular band differentiated it from any of the benign neoplasms. An eversion of the mucous membrane of the ventricle might look not unlike a condition that we had, only that it would not be firm and immovable. Syphilis scarcely entered into my calculations because the local picture lacked almost every characteristic of that disorder. The youth of the patient and a careful analysis of his personal history left my mind free of any doubt that occupied it at first as to the possibility of a malignant condition. That it was a primary laryngeal tubercular affection, I rejected, on

account of the suspicious early history, and on account of the frequent negative physical findings in similar cases.

Prognosis. The prognosis in this case, like in the previous one, appeared to me more hopeful if radical measures were employed. The quiescent state of the disease in the lungs, the sudden appearance in the larynx of an active tubercular process situated, so as to make its entire removal, for the purpose of complete exenteration of the diseased process, by intra-laryngeal methods, impossible argued well for a method that would allow free and easy access to the parts in order to allow the removal of all of the tubercular tissue. The patient was under observation two weeks, during which time he was most carefully, nourished, directed, watched and treated. The throat was not treated at all, but only examined about every other day. I noted the beginning of the tiny spots of ulcerations and the increase in the cough. The infiltrating character of the growth convinced me of the uselessness of attempting removal of all the diseased tissue by any intra-laryngeal procedure. Believing that the active process was centered in the region of the left ventricular band that delay would lead to extension of the process within the larynx and a lighting up of the latent condition in the lungs, I advised thyrotomy as a measure for exterminating this disseminating focus.

Treatment. The operation of thyrotomy, as proposed, was carried out. After division of the wings of the thyroid cartilage with a pair of scissors and bringing the interior of the larynx to view, I found the parts in a condition just as they appeared to me in the mirror, with the exception, that at the extreme posterior end of the left cord there was a small ulceration. As the cord could not be seen at all with the mirror on account of the over lapping of the tissues above, this, of course, could not have been discovered. The involved ventricular band was removed, with a pair of scissors, in toto. The excision was planned so as to include the healthy tissue surrounding the band if possible. The ulcerated area at the posterior end of the vocal cord was also removed. To the denuded surfaces full strength lactic acid was applied. A small tracheotomy tube was left in the cricothyroid space in order to anticipate any obstruction to respiration that might arise as a result of swelling. No such difficulty arose, however, and the tube was removed the following day, allowing the small opening to close by granulation. The patient's convalescence was uneventful. At no time after the operation was there any wound fever. On the second day he was sitting up, and on the sixth day he left for home. The hoarseness disappeared rapidly, so that within a week or ten days his voice was clearer than prior to the operation. He had gained six pounds in

weight and felt in excellent condition. A small sinus persisted where the tube was and this I thought to close by clipping off the exuberant granulation tissue around its opening and putting in a couple of sutures. But this spot refused to heal and gradually the healed surface over the thyroid became involved in a local tubercular disturbance. At first there appeared to be an intense dermatitis, the increased thickening of the thyroid cartilages bespoke a chondritis, the scar line gradually melted down, the skin edges appeared mouse nibbled and granulations sprang up rapidly in an effort to repair the slow but insidiously destroying process. After a month's time the parts were under control again, and in another month the wound had healed to within about half an inch. At this time, under the influence of his mother, the patient neglected my further advice, and placed himself under the treatment of a Christian Scientist. After three months he returned to me with but a fragment of his former health. The "Scientist" advised him to return to his doctor, as he could not do any thing more for him. Examination of the chest showed extensive tubercular involvement of the lungs, while the patient showed the great emaciation and weakness that was present. The appearance of the neck wound was just as it was three months previous. The exhaustion of the patient, at the time of this last visit, prevented me from obtaining a view of the interior of the larynx, and as he shortly afterwards left the city in quest of improvement by camping in the woods, I am still ignorant of the appearance of the interior of his larynx and the region operated upon. Since writing the above the patient's sister reports to me that the wound in her brother's neck has entirely healed, that his voice has returned to a considerable degree and that his general health has improved. He anticipates leaving for a southern climate this fall.

The piece of tissue excised and examined by the Zeit Laboratory, showed it to be tubercular.

In discussing the subject of thyrotomy, it is of interest to note that this operation was quite frequently performed in the beginning of the laryngoscopical era—the '50's. At that time the laryngeal mirror for the first time, revealed to the eye of the laryngologist the secrets of the inner recesses of the throat, but it took some years before he overcame the fear of invading these parts via naturalis. Hence thyrotomy became the popular method of operating for all intra-laryngeal neoplasms, benign or malignant. But with the advent of local anæsthesia with cocaine in 1884, the intra-laryngeal route took precedence as the method par excellence, especially for benign growths; and with time, experience in technique and improvements in instruments it has become almost the exclusive route for larynx

operations. But here as with everything else, there is a tendency to forget the old entirely for the new. The pendulum swings too far and we can never expect to reach the acme of our results until it returns to the happy medium. That thyrotomy has a place in laryngology goes without challenge, that was settled by Bruns of Berlin in 1878, during the controversy that waged between the general surgeon and the laryngologist, and besides this, the brilliant results achieved in late years in the treatment of malignant neoplasms of the larynx speaks eloquently for the operation. But that it is useful as a therapeutic agent in tubercular disease of the larynx will yet find many controvertists. Therefore, I believe every particle of light that may be shed upon the subject, by those who have had the experience in this work, will aid us in ultimately formulating something more decisive than the knowledge we have today upon the exact value of this operation in tubercular laryngeal disease. It is with this purpose therefore that I present to this body of laryngologists the report of my two cases.

It is impossible for us to support substantial views on the exact value of thyrotomy in tubercular disease of the larynx, on account of the comparatively few cases that have been reported as treated in this manner. Our text books, with few exceptions are silent on the subject. The review of the literature by Schech of Munich and Taptas of Constantinople reveals in all only 21 cases. One of Billroth's, one of Denio's, one of Henning's and one of Schonborn's died either of shock or of an intensification of the general process. In one of Hopmann's, two of Schonborn's and one of Kuster's, the larynx symptoms improved but death resulted from pulmonary progress. In one of Schnitzler's, three of Hopmann's one of Koch's, one of Schonborn's, and one of Kuster's, there was a happy improvement, both local as well as general. One of two cases of Grünwald's showed no sign of any return of the trouble 13 months afterwards. Hopmann's case of a minister who 11 years after the operation still continued the use of his voice in the pulpit, is celebrated. Kijewski, Baurowicz and Henning each reports a successful case.

The case Taptas reports cannot be classed under this heading, as the operation consisted of an excision of one-half of the thyroid cartilage, which was necrosed and associated with it was a large abscess. The result in this case though was good. Aside from the above cases I have been able to find the report of the following: A case of Gersters of a tubercular tumor of the larynx causing dysphagia and dyspnoea was cured of its laryngeal symptoms. Lack operated on a case in which the diagnosis was epithelioma but which proved to be tubercular. The immediate surgical result was beau-

tiful. Four months later glands in the neck enlarged, which were found to be tubercular on removal. The improvement continued. Goris reports two cases, one of which he showed two years later, before the Belgian Laryngological Society, as cured. The other one had a tubercular infection of the wound, similar to one of my cases, but it eventually healed. Bond and Symonds, each, report two cases. One of the former is said to be successful. Symonds declares both his cases unsuccessful. Moritz Schmidt, in his book, (1903), refers to seven additional cases, all successful and not already mentioned by me. One was a case of Sokolowsky's, two of Kuttner, two more of Goris, and two of his own. The first one of his own after six months, showed a nicely healed larynx; the second was a primary tubercular tumor in a man 48 years old who was seen in consultation with Pinner. The latter operated and after two years there has been no sign of a return.

The total number of cases that I have been able to find a record of has been 36, which with the two of my own, herewith reported, makes in all 38 cases. In order to analyze the value of these statistics it seems but just and reasonable to consider for a moment the prognosis of this disease. Schech says:

"The number of cases that completely heal and that remain so are extremely few. In most cases there is, sooner or later, a return of the condition, which is often worse and involves a greater area than the original, or the pulmonary disease makes such rapid strides as to soon end the life of the patient. Similar views are held by Moritz Schmidt and Heryng."

It is self-evident that the prognosis depends much upon the individual; his resistance; his powers of recuperation; his intelligence to carry out instructions as to mode of living, hygiene, diet, etc. Again the period of therapeutic intervention must be considered. Early cases are easier benefited than advanced cases. Control of the pulmonary condition enhances the prospects for the larynx trouble. Then too, the prognosis as to the relief of symptoms comes prominently in question. Dysphagia and dyspnoea are the two important ones.

Therefore all of these questions are to be considered in summing up the value of any particular line of treatment.

In the class of cases suitable for treatment by thyrotomy, the prognosis, to my mind, is better than in the more common varieties of larynx tuberculosis, and this even without any local treatment. But, good as it is, it is never more than a hopeful prognosis. Everything

depends more or less, upon the maintenance of a general health parity.

In the 38 cases just referred to, four died soon after the operation, without any improvement in the larynx. Four improved locally, but died shortly afterwards from pulmonary progress. Four are reported unfavorable, but to what extent I have not ascertained. The remaining 26 were benefited locally, and in many cases generally.

In the opinion of the author the following are the indications for the operations in tubercular laryngeal disease:

1. Limited and circumscribed involvement of the larynx, (especially tubercular tumors) particularly one-sided.
2. Before, or at the very earliest appreciable sign of ulceration.
3. Before any appreciable sign of pulmonary involvement, or at least during a quiescent pulmonary period with a well supported general physical condition.
4. In extremely sensitive and nervous patients, who do not allow unrestricted access to the interior of the larynx via naturum.

DANGERS AND COMPLICATIONS OF THE OPERATION.

1. Shock.
2. Aspirating pneumonia.
3. Incomplete operation, resulting in a return of the trouble in loco and in extensio.
4. Undue injury to the parts during the operation.
5. Tubercular infection of the wound.
6. Stenosis of the larynx from synechias, granulations or edema.

All of these dangers and sequelæ may be minimized to the utmost by a careful selection of cases; strict attention to the carrying out of the technique of the operation; rapid but complete work and close observation to the after care.

The advantages that the operation seems to offer are, accessibility, simplicity and thoroughness. Accessible by a median neck incision, the cartilage is easily divided and a most thorough exposure of the interior is readily made, allowing great leniency in the use of instruments in the excising process.

IN CONCLUSION.

Thyrotomy, for tubercular disease of the larynx, should be undertaken only after a most careful study of the case.

As a remedial agent it should be considered only in a certain limited class of cases, as considered elsewhere.

That to prove effective it should be performed early, and especially in the so-called or apparently primary cases.

It should be performed in the absence of pulmonary signs, or at least during a latent period of a pulmonary condition with a good general physical condition.

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The Presence of Cartilage in the Pharyngeal Tonsil—E. ZUCKERKANDL—*Monatsschrift f. Ohrenheilkunde*, Feb., 1904.

Zuckerkindl has examined the pharyngeal tonsils of adult lions and found that near the base of the tonsil, imbedded in the connective tissue stroma, is an incomplete layer of hyaline cartilage. It was not found, however, in all the tonsils examined.

YANKAUER.

THE PROGNOSIS OF LARYNGEAL TUBERCULOSIS.*

BY ROBERT LEVY, M.D., DENVER, COLO.

It would seem hardly necessary to repeat, especially before this association, the warning against condemning all cases of laryngeal tuberculosis. Unquestionably many cases are absolutely hopeless from the start, but this does not apply to all, and here as in other diseases, it becomes necessary to differentiate stages and varieties of the affection. As stated by Dock in his admirable address, "prognosis means not merely recognition of the name of the disease, but a knowledge of the nature of the disease, still incomplete, but rapidly gaining in fullness and accuracy," and so as our knowledge of the nature of this disease, its various modes of manifestation, its different pathologic processes, become more clearly recognized and recognizable, our understanding of its course and termination must necessarily change.

It is extremely difficult to prevent the pendulum from swinging too far, and this is particularly noticeable in those diseases which from time immemorial have been considered hopeless and regarding which a pessimistic view has become an established fact. One successful or favorable outcome in a case of this kind is liable to so raise the hopes of the observer that an extreme optimism is established and quite as much harm done as though the opposite still obtained.

We must go on studying with calm analytical judgment, case after case, separating and classifying the various stages and attempting by a careful diagnosis and by the observation of experience to arrive at the true scientific position. No matter how hackneyed our reiterations become, we must nevertheless continue the crusade against snapshot hopeless prognosis, which denies to the patient even an attempt at relief, to say nothing of cure, and also against the too hopeful prognosis, which encourages over treatment and defeats the very object it is intended to attain.

The relation between pulmonary and laryngeal tuberculosis must be considered from two standpoints, namely, the influence the laryngeal involvement has upon the pulmonary and that of the pulmonary disease upon the progress of the laryngeal complication. By far the

* Read at the Ninth Annual Meeting of the American Academy of Ophthalmology and Otolaryngology, held at Denver, Colorado, August 24, 25 and 26th 1904.

major number of cases of laryngeal tuberculosis occurs during the course of tubercular infection elsewhere, principally in the lungs, and is therefore secondary. We frequently see pulmonary cases progressing apparently favorably, when suddenly or gradually, slight hoarseness attended with indefinite sensations in the neighborhood of the larynx manifest themselves. A laryngoscopic examination may reveal a deposit of gray tubercles with swelling of the arytenoids of a pale edematous character, or there may be seen a slight, red infiltration, involving the vocal bands or the inter arytenoid commissure. In the former, in which distinct gray tubercles with edematous swelling present themselves, one may conclude that the laryngeal infection is of a serious type, which will rapidly increase the patient's unfavorable symptoms now developing and which itself will follow an unfavorable course. On the other hand those cases of simple red infiltration may mean nothing more than a catarrhal inflammation in a tubercular subject, and if unfavorable general symptoms develop, the larynx cannot be held responsible for them. These cases progress favorably so far as the laryngeal complication is concerned.

Again the bearing of the pulmonary disease upon an already infected larynx is of extreme importance. Definite cases of laryngeal tuberculosis of the infiltrative type especially, as well as some cases of the ulcerative type, improve gradually so long as the pulmonary or general tuberculosis continues to improve. When, however, the cough becomes worse, the temperature remains high, night sweats redevelop and other symptoms of unfavorable progress manifest themselves, it is not uncommon to see the larynx rapidly pursue an unfavorable course.

The two important functions which are materially involved in laryngeal tuberculosis are phonation and deglutition. Slight hoarseness gradually increasing to complete aphonia occurs in all cases of laryngeal tuberculosis sooner or later. True, there is a certain proportion of cases in which the involvement is only of the epiglottis and in which the voice is not materially affected. Sooner or later, however, extension to the interior of the larynx, to the arytenoids and to the vocal bands causes voice symptoms. Both the infiltrative and the ulcerative types cause vocal disturbances. In both of these pathologic varieties a favorable result may be brought about and the voice be eventually restored, if not to a normal, still to a fairly useful condition. Much will depend, in both instances, upon the situation of the lesion. The infiltrative variety may involve a large portion of the larynx, including the vocal bands, and if other conditions prove favorable, absorption may be induced and the voice im-

prove. A large percentage of infiltrative cases never goes on to ulceration. The infiltration becomes more marked or more firmly organized and cure may be said to result by virtue of fibroid changes, which do not participate in active tubercular destruction. Many patients are extremely anxious, even to a condition of morbid anxiety for a restoration of the voice. Where absorption can be brought about, the patient will be restored to a happy existence. In many cases, however, this is not possible, and here it becomes our duty to assure the patients that the existence of the hoarseness is not necessarily an evidence that the general disease will progress unfavorably, and that so long as the pulmonary or other complications do not cause unfavorable developments, the larynx need not be feared. Restoration of the voice in ulcerative cases takes place where the ulcerations have not destroyed too much of the vocal bands and where the edematous swelling surrounding the ulcerations subsides. Here the activity of the process, the presence or absence of distinct deposits of gray tubercles and the general condition of the patient must be our guide.

Disturbance in swallowing may be of two characters. Swelling of the epiglottis or the ary epiglottic folds may cause great difficulty in deglutition without pain because of mechanical interference. Ulcerations situated upon the epiglottis, ary epiglottic folds or the arytenoids cause difficulty in swallowing because of intense pain. Here again the activity of the process, as indicated by pale edematous swellings with deposits of tubercles indicates a probably unfavorable outcome. Unless the dysphagia and odynophagia can be readily ameliorated by proper treatment, the patient's general condition visibly fails and the larynx makes a corresponding unfavorable termination.

Experience has taught us that the nature of the lesion controls to a considerable extent the prognosis. There are different forms of the infiltrative type. Some partake of the nature of slow connective tissue deposit. These may be considered favorable types. Others are pale edematous infiltrations with deposits of gray tubercles plainly apparent beneath the mucous membrane. These are unfavorable types and usually go on to extensive ulcerations. The ulcerative variety is also of several kinds, the main point of distinction being the activity of the ulcer and the rapidity with which it develops.

The situation of the lesion is also of much importance, intra laryngeal manifestations showing much more tendency to heal than those situated upon the epiglottis or the ary epiglottic folds.

As in other tubercular lesions the earlier the laryngeal complication is recognized, not only in regard to its own development, but also in regard to the time it manifests itself during pulmonary or other lesions, the more hopeful does our prognosis become. Also, as in other tubercular lesions, the more favorable the patient's surroundings are the more may we hope for improvement.

The prognosis is materially influenced by the environment of the patient, his ability to surround himself with the comforts of life, with proper rest to the voice and suitable hygienic and climatic conditions.

SUMMARY.

1. The prognosis of laryngeal tuberculosis depends upon our understanding of its nature, its varieties, its stages.

2. All cases are not hopeless, nor should one cure cause too much optimism.

3. Laryngeal tuberculosis materially influences pulmonary and general symptoms.

4. Per contra, it may possess no bearing upon the general course of the disease.

5. The course of the pulmonary invasion markedly affects the laryngeal complication.

6. Disturbances of phonation are due to infiltration, to ulceration or both combined. In many cases the voice may be much improved.

7. In extreme infiltration where improvement may not be obtained, the process does not necessarily go on to ulceration, or cause general decline.

8. Disturbances of deglutition may be due to swelling without pain or to pain, namely dysphagia or odynophagia, and here the character of the lesion influences the prognosis.

9. Intra laryngeal lesions improve more rapidly than those situated on the epiglottis or ary epiglottic folds.

10. Early recognition of a primary lesion or secondary complication is essential to a favorable termination.

11. The patient's environment and his ability to rest his voice influence the prognosis.

12. Suitable hygienic and climatic conditions are essential to a favorable outcome.

PHARYNGOCELE, OR DIVERTICULUM OF THE PHARYNX.*

BY WM. D. BLACK, M.D., ST. LOUIS, MO.

ETIOLOGY.

Regarding the true origin of these pouches there seems to be different opinions. Among the probable causes we have:

First. Congenital, those due to the nonclosure of the branchial clefts forming inner incomplete fistula. References Kostanechie. L. Brown, Wyle, Von Bergman and others.

* Second. Weakness of some part of pharyngeal wall. McKenzie, Newcomb, Kyle, Wright, L. Brown and McBride.

Third. Those arising from stricture of œsophagus and developmental defects in which the lower part of pharynx may take on sacculation.

Under the head of Congenital Defects we must have contributing causes in order to form pouches. These small incomplete fistulæ may become large sacs by any sudden or gradual pressure. Under that of sudden pressure may be mentioned Traumatism, heavy lifting, and excessive vocal effort. Under the caption of gradual pressure we have, sudden bolting of imperfectly masticated food, over-filling the channel with fluids, and foreign bodies lodging in these pouches.

Under the caption of weakness of some part of wall without inner incomplete fistulæ we have, improper mastication and swallowing of food, over-filling the channel with fluids, and loss of muscular tone due to disease.

It seems quite plausible that these sacs can arise from repeated continued efforts on part of patient to rid the channel of its contents, and this force, or outward pressure, not being equally distributed causes the weakened part of the wall to yield.

PATHOLOGY.

Rokitansky made a post mortem in a case which had existed for 46 years. The mucous membrane at the back part of the mouth was thickened and the upper part of pharynx was cedematous. On the level of the inferior constrictor the membrane was prolonged through the fibres of the muscle, into a diverticulum about two inches long.

* Read at the Ninth Annual Meeting of the American Academy of Ophthalmology and Otolaryngology, held at Denver, Colorado, August 24, 25 and 26th 1904.

The walls of the pouch contained a few bands of pale muscular fibres.

Bertig found in the cadaver of a man 55 years old, in the upper part of pharynx, bilateral, symmetrical, moderately fluctuating sacs. These overlapped the superior concave margin of the superior constrictor and were mostly lateral like a hernia. These are the only cases that I could find in the literature at my disposal where a post mortem had been made.

SYMPTOMATOLOGY.

The symptoms of diverticulum must vary according to the position and size of the pouch. Small diverticula may exist and cause practically no symptoms. When they occur laterally and high up there exists a feeling of fullness in pharynx. Dysphagia without actual pain. When filling of pouch occurs you will find a tumor in the side of neck.

Ejection of food is a symptom of importance, especially when you have the tumor externally and which recedes after ejection of food. Spasm of larynx due to small particles of food falling into it when the sac is being emptied. Protusion of the pouch. Increased secretion of saliva. A few cases, including my own, complained of this, and am inclined to believe it is simply reflex from the obstruction.

Emaciation. This is variable as many cases appear well nourished. Emaciation can occur where the diverticulum is low or due to stricture of œsophagus. When the pouch is low in the posterior wall of pharynx the sac frequently passes downward between the œsophagus and vertebral column and, unless elongated, or where it is not easily emptied, there is little danger of emaciation.

AGE AT WHICH THEY OCCUR.

These pouches may occur at any age, although I believe they are more frequent in the young owing to congenital defects in development. Those cases occurring in middle life are all probably due to weakness in the pharyngeal wall.

DURATION.

The length of time these diverticula may exist without danger to life is very indefinite. Cases have been known to have existed for 40 to 50 years. Mackenzie and Rokitsky.

DIAGNOSIS.

The diagnosis is usually easy as the patients do not complain until the pouches are quite large and then by laryngoscopic and digital examination you can see and feel the offending mass.

PROGNOSIS.

The general opinion among laryngologists is that they are not dangerous to life, but I do not take so sanguine a view. When the sac is elongated and low down in the pharynx there is danger of emaciation from pressure on the œsophagus, and, when they are high up in the lateral wall of pharynx, they can pass downward and cause suffocation.

TREATMENT.

Electricity; massage; bandage of neck; thorough mastication of food; drinking and eating slowly of semi-solid or liquid food. Operation when dangerous to life or great inconvenience to patient. Billroth. Von Bergman and others have dissected them out successfully.

REPORT OF CASE.

Patient referred by Drs. Higginbottom and Greer of Vandalia, Ill. Name, Samuel X.; age, 54; color, white; weight, 170 pounds; occupation, farmer; previous history good. No specific or organic disease. Patient apparently healthy.

About two years ago patient experienced a soft mass protruding into the back part of mouth and recurring at irregular intervals. There was no pain on swallowing. After a time patient claimed that he could catch the soft mass between his teeth, and that it was not painful on pressure. I was informed that about two weeks before seeing the case a physician near Vandalia caught the mass with a forceps and removed a part of it, causing severe hemorrhage. After consultation, the physicians in attendance decided to place patient under my care.

EXAMINATION OF PATIENT.

Nose. Right nostril; large middle turbinal. Left nostril; small ridge in the septum with some enlargement of turbinals. Post nasal space. No abnormality other than a slight enlargement of turbinals. Pharynx: Arches, pillars, post pharyngeal wall and base of tongue normal.

Examination of Larynx. Owing to the extreme sensitiveness had to cocaineize thoroughly. I suspected a pedunculated cyst of the larynx and was much surprised upon finding it normal with the exception of a small clot of blood on the right cord. Now, being positive that the disturbance was not in the larynx, I proceeded to examine the lateral and posterior walls of pharynx, and found that on the posterior lateral wall of right side there was a small mass, somewhat rounded in form, about $\frac{1}{3}$ to $\frac{1}{2}$ inch in diameter, situated

about on a level with the upper margin of epiglottis. Next made digital examination, causing patient to gag, and then the mass appeared apparently resting on the dorsum of tongue. From its color and general appearance it resembled the normal mucous membrane, only it appeared irregular and not rounded as it did in the position of rest. It remained stationary only for a few seconds, disappearing rapidly by the patient's forced efforts to swallow. I repeated the digital examination several times, and each time the mass appeared as before almost filling the fauces.

The diagnosis of pharyngocele was then made and decided that the case would make an interesting clinic and had the patient accompany me to the College (Medical Department of St. Louis University), and had Dr. H. W. Loeb examine the patient. His examination revealed the following: A small fairly rounded mass about $\frac{1}{2}$ inch in diameter appeared on the posterior lateral wall of pharynx, the superior margin of the mass being just about the level of the epiglottis when in its erect position. When the patient's throat was manipulated, so that he gagged, the character of the condition became manifest as there was an evagination of the sac to such an extent that the anterior end of the mass reached the hind molars. Its size was approximately about $2\frac{1}{2}$ inches by $\frac{2}{3}$ of an inch in diameter. Before the mass appeared the patient seemed to be trying to regurgitate food. Dr. Loeb now agreed to the diagnosis and thought it was of congenital origin, but owing to the duration and seemingly sudden onset I thought it was acquired. In my opinion the constrictors played a prominent part in the expulsion of the mass, probably through irritation causing the muscles to contract and forcing the pouch upward. We could not find the place where it had been incised and my explanation is that it had probably healed. He complained of some soreness on that side. The tumor or mass appeared about two weeks after he first complained and after a few months it appeared quite often; some days it protruded twenty times. By assuming the stooping attitude, such as in hoeing corn, etc., it would appear, showing that it certainly was lax and followed the law of gravity.

Patient had to return home and nothing more was heard of him until December 8, 1903. His physical condition was about the same, only his throat was causing him more trouble than before, the tumor appearing about six times daily and, using his expression, packed or clogged his throat, and he feared suffocation. I decided to treat him with the galvanic and faradic current and inserted the positive pole on the posterior lateral wall of the pharynx as low down as I could, and the negative on outside of neck. Used it for ten minutes

daily for one week and after the first day the mass stayed in position and never appeared again while patient was under treatment.

About the second day after using the current had Dr. M. A. Goldstein see the case, and upon laryngoscopic examination found the mass in the hypopharyngeal space on right side. It still had the somewhat rounded appearance and the diagnosis was again confirmed. Could not get him to protrude the mass by digital examination and concluded the electrical current increased tonicity of the membrane. Had patient get a small battery to use at home and put him on strychnine—1-30th grain three times daily. Received the following letter from his friend, he being illiterate, dated December 31, 1903: He had not seen Mr. X., for two weeks, but the last time he saw him he felt somewhat better but still had choking spells.

January 9, 1904, received another letter from his guardian in which he stated that Sunday night and Monday the patient had a severe spell. Suppose he meant choking attack.

It was arranged that the patient would again be under my care as soon as he felt better, but on Wednesday, 3 a. m., he died. His sister informed his friend that she found him on the floor gasping for breath and after a few seconds he was dead. From the entire description there is little doubt in my mind but that the mass passed downward into the larynx and caused suffocation.

Had the authorities on the subject not given such a good prognosis in regard to life, am positive I would have dissected it out. If I should ever get another case and the sac as large and troublesome as the one under discussion am sure I would not hesitate to operate.

A Pair of Pharyngeal Scissors—H. CORDES—*Monatsschrift f. Ohrenheilkunde*, Feb., 1904.

These scissors have short blades and long handles. The blades are curved on the flat to an extreme degree, and are probe-pointed. They are used to remove granulations from the pharynx, as well as the strings of adenoid tissue found along the sides of the pharynx, in lateral pharyngitis.

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**CONGENITAL BONY ATRESIA OF THE POSTERIOR NARES;
OPERATION, PARTIAL RESULT.***

BY W. SCOTT FRANKLIN, M. D., SAN FRANCISCO, CAL.

Miss A., aged 21 years, entered the Emanuel Sisterhood Polyclinic on Oct. 8th, 1903, with the following history: She is one of seven children all small in stature but in good health. Mother living and well; father a somewhat dissolute man, who left his family ten years ago. Since childhood patient has been unable to cleanse the left side of the nose by blowing and the discharge is so copious that she uses eight handkerchiefs in a day. She has visited several clinics where the surgeons with but a cursory examination told her she had a growth at the back of the nose. The mother being illiterate, apathetic and unintelligent, it was impossible to get a history of patient's infancy, viz.—difficulty in suckling, breathing, etc.

The nervous phenomena usually found associated with adenoids and most naso-pharyngeal obstructions were not clearly marked; the typical choking spells of the night and reflex bronchial asthma being absent. The mouth-breather's appearance, the so-called "adenoid face," is not present, but one could see at a glance that some interference with nasal respiration existed.

Status Praesens. The patient is small of stature, being only four feet nine inches tall and she is the shortest in the family. I find her well nourished, but poorly developed; the chest, in particular, showing the arrested development.

Asymmetry of the two sides of the face is quite pronounced, the measurements being taken from the external palpebral canthi to the center of the chin. The left naso-labial fold is decidedly less apparent than the right, giving the former side of the face a somewhat flabby appearance. The nose is small, while the play of the left ala during respiration is naturally missing.

Examination of the mouth shows the hard palate to be rather high and very narrow, no difference in the height and development of the alveolar ridges being present. The smallness of the parts caused the only real difficulty in posterior rhinoscopy as the pharyngeal reflex was diminished. The vault of the pharynx is free of adenoids, the mucous membrane smooth and pale.

*Read at the Western Section of the American Laryngological, Otological and Rhinological Association.

The choana on the right side is negative; on the left appreciably smaller, the free end of the bony septum being deflected from the median line to this side, a condition which in itself is rare. I could readily see and probe the bony wall obstructing the left posterior nares which lay anterior to the end of the vomer, the posterior vertical and horizontal plates of the os palatum, constituting this a case of the second class or intra nasal atresia. The left os tubæ is free and with but little difficulty was catheterized from the opposite side of the nose.

Examination of the anterior nares showed hypertrophied turbinates on the right side with a deflection of the septum to the left. The left, the interesting side, was full of particularly tenacious mucus and as attempted washings invariably caused the patient headache, I freed the nose with pledgets of cotton, using 43 at one sitting. The septum was found bent vertically and with an antero-posterior convexity to this side a horizontal ridge on a level with the inferior turbinal body forecasting an agreeable operation. The turbinates were atrophied and cocaine with adrenalin diminished their volume but little. The floor of the nose under about the center of the inferior turbinate was scooped out, forming a bony cul-de-sac, the posterior ascending wall being continuous with the obstruction to the naso-pharynx. This partition was covered with the mucous membrane of the nose and to the probe appeared quite hard. On palpation with the finger in the naso-pharynx and a probe in the nostril, I was led astray as to the probable thickness of the bone. The piece removed later by the trephine proved 16 m.m., approximately $\frac{5}{8}$ th of an inch thick, or about double what I had judged it to be.

No shadowing was evident on transillumination through the mouth and the patient perceived the light equally well with either eye. By placing a small pea lamp in the naso-pharynx and examining the left anterior nares in a darkened room, it was found that the obstruction was evidently too thick to allow the passage of light.

Both ear drums were found retracted with good hearing on either side, the left was not less acute than the right. The sense of smell was absolutely nil on the left side, an atomizer being used, proving that the end filaments of the olfactory are atrophied through non-usage. On the right side it appeared hyper-sensitive. Her sense of taste proved acute and her speech, though nasal in character, was less so than one generally finds in adenoids.

Operation under narcosis was suggested, but patient absolutely refused to take an anæsthetic.

On Oct. 17th, the left inferior turbinate was removed which gave a good view of the obstruction with the exception of the septal por-

tion, that being hidden, owing to the antero-posterior convexity of the septum. Three days later I thoroughly cocaineized the obstruction on either side and with a very long trephine, driven by a relatively powerful motor, drilled a hole directly through the center. The patient was exceptionally brave and did not seem to be in much pain. My efforts thus far were amply repaid when I saw the look of surprise and exultation on her face as she blew the left side for the first time in her life. Her emotion was extreme and ended in an hysterical attack. The bone, as I mentioned before, was $\frac{5}{8}$ th of an inch thick and ebony hard. The bleeding was rather profuse but at no time uncontrollable. I was not able to pass a strip of gauze through the canal as its small size and length made this impossible. The nostril was packed with gauze and the patient told to return the next day. She suffered no secondary hemorrhage and no pain in the nose but the upper teeth on the left side were extremely sensitive. Two weeks later a second hole was drilled a little above and internal to the first, the patient giving signs of great suffering. I had her report at regular intervals, as I wished to watch the course of healing and see whether the tendency to closure was very marked. From its rapidity I hoped to gain a hint as to future operative interference and prognosis.

On Nov. 21st she complained so bitterly of pain that it was impossible to proceed, and a general anæsthetic was forcibly urged, but more forcibly declined. I saw her again on Jan. 22, 1904, and found that the openings were gradually closing but her general condition was greatly improved. The canals were lined with granulation tissue and a probe passed readily into the naso-pharynx. The copious discharge had stopped and she was very comfortable. She could still blow the left side but it was difficult to inspire through it.

Unfortunately I was not permitted to proceed as the operation under cocaine was too painful and patient's antipathy to chloroform still existed. She is very pleased over the result and probably wishes to leave "well enough alone," but when the opening has closed, I expect to have her back.

I have purposely omitted a rehash of the literature as those interested in the subject can find a most able and exhaustive article by Dr. R. Kayser in Prof. Paul Heyman's Handbook of Rhinology.

751 Sutter Street.

PURULENT OTITIS MEDIA COMPLICATING TYPHOID FEVER.

BY EWING W. DAY, M.D., & CHEVALIER JACKSON, M.D., PITTSBURG, PA.

That the ear complications of typhoid fever have never received the attention they deserve is shown by the paucity of literature on the subject. The reason, doubtless, is that it is almost never fatal in a few days; as is often the case with hemorrhage, pneumonia, perforation, etc., yet it is in some instances as grave as any of these, though not being so immediately serious, its true import is overlooked. The near or remote future, with its possibilities of mastoid empyema, intracranial complications, or chronic suppurative otitis, deafness, foul otorrhea, facial paralysis, etc., is lost sight of. Lermoyez states that the staff of a French hospital told him that the acute otitis cases, (in children's eruptive diseases) were very mild, a little carbolated glycerine being all they needed. At the same time they mentioned that most of the cases left the hospital with ears still discharging slightly. Comment is unnecessary before of otologists.

Deafness in typhoid fever. It is not contemplated in this paper to consider the non-suppurative ear complications further than they may bear, or might be thought to bear on the suppurative conditions. All clinicians have noticed lessened auditory acuity in typhoid fever. This has been attributed to blunted perception, deemed central and due to toxemia.

In an examination of the ears in typhoid fever, we were at once struck with the fact that practically all cases could be classified into two great classes, dullness of hearing with and without evidence of middle ear inflammation. This dullness of hearing was analyzed as to etiology in 51 selected non-suppurative cases. It was found to be due to the tube in one, because the patient, a mild case, volunteered the statement that he heard better after swallowing 3 or 4 times, and on test was found to hear normally. Only 12 cases were catheterized as a test and they were all patulous. Dullness of hearing was found to be due to non-suppurative middle ear conditions in 17 cases, (some of these might have been tubal). The perceptive apparatus, including the sensorium, was found at fault in 23 cases; both perceptive and conductive mechanisms in ten cases.

These data must not be taken as absolutely correct for very apparent reasons. The cases were selected for their mildness, their

intelligence and the speaking of a language of which we had at the time a skillful interpreter. They were all examined between the 10th and 20th days of their illness.

With a view of gaining a little information in regard to otitis media purulenta acuta, a complication of typhoid fever, a number of series of observations during a year past were made in the medical wards of the Western Pennsylvania Hospital at Pittsburg. This series of cases embraced first 280 cases of typhoid fever examined in the nose, throat and ear on admission and at intervals afterward. Other series embracing the purulent otitis cases of the first series and various other series were analyzed from carefully kept records. It was not possible to follow every case in all the lines of investigation. This accounts for the many separate series of cases, with different numbers in each.

In further considering the observations here recorded percentages, etc., it must be remembered that these were all hospital cases that they were consequently nearly all severe infections, aggravated before admission by working during the early stages, by the eating of a general diet, and by all kinds of neglect. No cases of paratyphoid fever are included, so far as known.

OTITIS EXTERNA.

Two cases of otitis externa circumsonpta occurred. This seems a rare complication. Bezold in 1243 cases of typhoid fever with 50 cases of ear involvement did not see a single case of otitis externa. No other writer mentions it. In one of our cases, free incision and drainage with a little wick of gauze resulted in a slow but uninterrupted recovery. In the other case, the process penetrated deeply, setting up a periostitis. An incision down to the bone extending from near the tympanic membrane out to the tragus, with occasional curettement, packing with gauze, etc., was the treatment; but in spite of this, the pus worked its way outward and developed quite a collection in front of the tragus. An incision here, with through drainage by means of a wick of gauze pushed in the external wound and brought out in the canal, brought about a slow recovery of 7 weeks duration. It was a continual fight with exuberant, flabby granulations and tissues reluctant to heal, on account of a system profoundly poisoned by toxins.

That external otitis did not occur often in the suppurative cases is remarkable, when the virulence of the pus is considered; and also when we consider the frequency with which the ear is fingered by the patient. As mentioned under bacteriology, the external canal was always found sterile at the deeper osseous portions, but

infected near the concha. The latter location is, of course, where furuncles usually develop, and was the location in the two cases mentioned. That it did not occur oftener, considering the frequency of median otitis, seems to point to a lessened resistance of the mucosa, and an undiminished resistance of the skin.

DISORDER OF THE PERCEPTIVE APPARATUS.

No special investigation of this was made further than to record its presence. Abnormality of the perceptive apparatus was found in 33 out of 55 typhoid fever cases. It came on in the first or second week and lasted until the temperature reached the normal.

Dr. Dench in his classical text-book, under the head of typhoid fever involvement of the perceptive apparatus, attributes the diminished sound perception to the effect of the specific poison on the cerebrum itself, rather than on the nerve distribution in the labyrinth, on account of the disappearance of the impairment of hearing during convalescence. This seems to be borne out in a few of our non-tympanic cases, but in the most of them, the annoyance produced by severe tinnitus seemed to indicate that the toxemia was acting more powerfully on the labyrinthine nerve endings than on the sensorium. It has been argued by Politzer and others that the earlier disturbances of the labyrinth are hyperemic and the later disturbances anemic. This seems refuted by the fact that there is not the hyperemia in any portion of the head in typhoid fever that there is in, for instance, pneumonia, which is free from non-suppurative labyrinthine trouble. As to anemia as a factor it is present during a considerable part of the convalescence, while the labyrinthine trouble ordinarily ceases on the eve of convalescence.

ACUTE CATARRHAL OTITIS MEDIA.

In 8 out of 280 (2.9 per cent) cases of typhoid fever there were evidences of a mild otitis which subsided without rupture or incision of the drum membrane. We did not find catarrhal otitis as common as the catarrhal affection of the upper air passages. Cases which went on to purulent otitis were not included in the figures given.

MYRINGITIS.

Six cases of this were found in 280 cases (2.1 per cent) of typhoid fever. Of course only those cases were counted that showed no middle ear affection.

ACUTE PURULENT OTITIS MEDIA.

Literature. The earliest and also the most erroneous reference to ear affection in typhoid (or typhus fever) is that of Frascator¹

in 1564, who said "*surditas salutem portendit*." The same error was voiced three centuries later by Allison² who in 1849 said "Deafness is rather a favorable symptom in typhoid."

The earliest record found of otorrhea was that of Louis³ who in 1841, refers to ear suppuration followed by meningitis. Peacock in 1856,⁴ Wilson in 1881,⁵ and Murchison⁶ all report similar cases.

Murchison⁶ writes: "I have known rigors, high fever, intense headache and delirium and even convulsions, occur during convalescence, and cease at once on the appearance of discharge from the ear."

Trousseau⁶ in 1861, states that if both ears be affected, it is usually due to a catarrhal extension from naso-pharynx through the Eustachian tube; whereas, if but one ear be affected it is due to a purulent otitis, an occasion for graver prognosis.

Oppolzer⁷ attributes deafness in typhoid fever to three causes; Catarrhal extension from naso-pharynx; central nervous disorder from blood dyscrasia; periostitis of the middle ear. Of these catarrhal extension, he regards as common, central nervous disturbance rare, periostitis he considered metastatic in origin.

Moos is quoted by Bezold as reporting two cases of total deafness which were referred back by the patients to an earlier attack of typhoid fever. One had bilateral deafness with residua of a purulent inflammation; both drum membranes being sunken in darkened and perforated in the center. In the other case, the drum cavities and drum heads seemed normal on both sides.

A degree of inaccuracy exists in the earlier observations, especially the European, in that typhoid and typhus (which also has ear complications) are in some instances considered together. Of course, in later observations this does not occur.

Coomby⁸ considers deafness and tinnitus pathognomonic of typhoid fever. Nearly all the leading text books on internal medicine refer to deafness, a few of them to tinnitus, as symptoms in the second week of typhoid fever. This, of course, independent of suppuration. Few mention suppuration, and only two give any suggestion as to its treatment.

Frequency. The exact frequency of otitis media purulenta as a complication of typhoid fever is exceedingly difficult to determine. It might be expected to vary in the different epidemics, different countries and different social conditions and surroundings. Few statistics are available because, with one or two exceptions painstaking records have not been made.

Bezold in four years (1876-80) saw 1243 cases of typhoid fever and saw 48 (3.9%) ear complications exclusive of purely nerve con-

ditions and the dullness of hearing due to antipyretics (presumably quinine at that date). This is an astonishingly low percentage.

Louis records that out of 45 severe cases, of typhoid fever that recovered, the ear in four cases (8.9%) had discharged, and though a perforation was observed in one case only, it is probable that all were median otitis. In 24 mild cases, one (4.2%) had suppurative ear trouble, though three complained of ear pain. In 30 cases that died of typhoid fever he noted no case of suppuration—probably, we suggest, because they died too early in the disease.

Beverly Robertson¹⁰ states that "otorrhea" is more frequent among children than with adults, but does not give his observations of the frequency of either.

Solis Cohen and Claribel Cone in 1893, report a case of purulent otitis "deemed worthy of record because it was of rare occurrence in this hospital" (Philadelphia) although it healed with a perforation, but without otorrhea or mastoid or other complications.

Raoult and Specker¹² give no figures, but make the general statement that otitis media is a very frequent complication of typhoid fever. This is in 1902 and probably refers to cases occurring in Nancy, France.

Hengst in 1896, collected 28 cases of purulent median otitis occurring in 1228 cases of typhoid fever. Five hundred and seventy-five of these cases were private cases. The percentage, $2\frac{1}{2}$ %, was about the same in both classes of patients.

Stricker reports 34 cases of otitis out of 172 cases of typhoid fever, (19.7%). Jessen, 13 out of 187 (7%). Hoffman, 4 out of 250 autopsies (1.6%). Osler, 8 out of 389 (2.1%).

Vickery reports for four months, July to November, in 1902, at the Massachusetts General Hospital, in 49 cases of typhoid fever, two instances of purulent otitis (4%) one of pneumonia and three of hemorrhage.

For 1902, in the Boston Hospital, Sears reports 11 cases of otitis media in 203 (5.4%) typhoid fever cases, standing next to pneumonia (12 cases) and phlebitis (12 cases) in frequency as a complication. In comparing such reports with the percentages given in our cases it must be borne in mind that in few if any of the hospitals can the records of the ear complications of typhoid fever be relied upon for completeness. We made almost daily visits to the hospital and made it a duty to record all cases of otitis during an entire year.

Systematic inquiry into the frequency of purulent otitis in typhoid fever in private practice has not yet been made by us, as it seemed,

in making personal inquiries, that mental records would be the only ones available, and these are notoriously unreliable.

Personal inquiry among general practitioners of large practice, revealed that eight of them never saw a case among several hundred typhoid fever cases. These men said they rarely saw a severe case of typhoid fever in private practice. A mild type was the rule. Four men in large practice in the poorer districts frequently saw very severe and fatal cases of typhoid fever and occasionally saw a discharging ear. This seems to point to the hereinafter mentioned observation that the severity of the case is an etiologic factor.

Coming to our own observations in the Western Pennsylvania Hospital at Pittsburg, in 780 cases of typhoid fever, otitis media purulenta acuta was noted in 88 cases (11.3%) 45 times (51.1%) it was only on one side (26 left, 19 right); 43 times (48.9%) on both sides. It was during this period the most frequent of all the complications. It has developed this prevalence in recent years, though it is greatly on the decrease in the last few months and at the present time it is down to one case in 64 (1.6%). Statistics on the frequency in this hospital prior to 1903 are not available, so that the very interesting point as to whether or not these cases occur more frequently in recent years cannot be proven in figures.

Statistics on this point are difficult to obtain and are valueless. There has never been in most hospitals, any attempt at recording these complications conscientiously. It certainly does not appear at all in many reports and in others it has only appeared in recent years. Former residents and nurses in the Western Pennsylvania Hospital remember occasional cases, but all are certain that it was less frequent formerly.

Those practitioners in private practice who have had cases were inclined to look upon it as a complication of recent prevalence. Mention is made of it in literature many years back, yet in Pittsburg, at least, it is certainly more prevalent now than ever before and it is certainly more frequent in the hospitals than in private practice.

One thing is quite certain, purulent otitis media is never overlooked when present in typhoid fever. It is accompanied by such a copious outpouring of sanguinolent serum in the early stages that it could never escape observation.

BACTERIOLOGY.

Acute otitis media independent of typhoid fever is usually but not invariably, monomicrobial. Chronic purulent otitis media is invariably polymicrobial; usually staphylococcal with saprophytic mixture. Theoretically it would seem unlikely that there is a true typhoid in-

flammation of the membranous lining of the middle ear as in diphtheria, etc., on account of the difference in the selective properties of the organisms. Eberth's bacilli do not attack the naso-pharyngeal mucosa as Klebs-Loeffler bacilli do. Eberth's bacillus is pyogenic as proven by Mya, Belfanti, Dmochowsky and Janowsky, Black, Orloff and Gilbert and Girode. It has been found more or less abundantly in many of the purulent complications of typhoid fever.

Destree, Prochaska and Preysing have found it in suppurating ears of typhoid fever patients. Coplin found it associated with pyogenic cocci in a case of mastoiditis in typhoid patients. Many observers have not found it. Possibly it may have been present earlier and disappeared after the later mixed infections. Funke reports two cases of typhoid bacillus present in middle ear suppuration in pure culture and two cases associated with pyogenic cocci. He reported the organisms most common in the pus of otitis media in order of frequency as follows:

Pneumococcus,

Streptococcus,

Pyogenic Staphylococci (Albus and Aureus),

Bacillus of Friedländer,

Bacillus diphtheriae.

Durin in two bacteriological examinations did not find typhoid bacilli in purulent otitis complicating typhoid fever. The diplococcus of pneumonia has been found by several observers. Fraenkel and Simmonds found pyogenic bacteria in middle ear discharges but were unable to find the typhoid bacillus.

A review of the literature will indicate clearly that we are not aware of all the factors involved in the sterility or infection of the middle ear. Thus Zaufel, from investigation on rabbits, concluded the tympanum is by no means always sterile, the number of bacteria increasing the nearer the approach to the pharyngeal orifice of the tube. On the other hand, Preysing out of 78 ears found (post-mortem) 67 sterile and 11 infected, but apparently healthy, from which he concluded that the normal ear is practically sterile. We are somewhat in the dark as to the number of bacteria required to start an infective disease, not in the ear only but in any tissue. Doubtless the number varies widely dependent upon many factors. In the normal ear as in other organs it is reasonably certain that a limited number of pathogenic organisms may be and often are present without lesion. Exactly the proportionate share in the protection taken by the body juices, by healthy epithelium, adequate drainage and phagocytosis or its equivalent in cell action, is not agreed

upon. It is, however, an accepted fact that there is a protective power exerted by the healthy organism, which power varies greatly and becomes very much lowered in a great variety of acute and chronic ailments. It is possible also that these ailments increase the virulence of the bacteria so that their attacking power is greater; for it is now well known that pathogenic power is not necessarily in proportion to numbers, virulence being equally a factor.

Bacillus diphtheriae has been found (Prochaska) associated with pus cocci in otitis pus in typhoid fever cases, although undemonstrated in the throat. The bacillus typhosis has been found in typhoid fever in surgical complications of the bones, periosteum and cartilages, in abscesses of ovary, spleen, liver, kidney and cellular tissue; in orchitis, epididymitis, thyroiditis, localized peritonitis, endocarditis, cholecystitis, meningitis, pleurisy and a number of other conditions and locations. In all these there was suppuration, but the bacillus typhosis has been found without lesion in bone marrow and in lymphatic glands.

All the mucous lined cavities of the body have been shown to intermittently, if not constantly, contain a varying number of pathogenic organisms, which owing to defensive power of normal epithelium, ciliated or not, of body juices and of leucocytes, gain no foothold. It is a well recognized fact that in typhoid fever we have a very low resisting power as evidenced by the long list of pyogenic invasions of nearly every organ in the body by organisms every day carried about with immunity by the normal individual.

How far the virulence of bacillus typhosis might be increased by being confined in a closed cavity like the middle ear, where the contents are not constantly moving, can only be conjectured.

Coming to the results of our investigations, with the assistance of Dr. Ralph Duffy, pathologist of Western Pennsylvania Hospital cultures were taken from the naso-pharynxes and external auditory canals of 60 cases of typhoid fever, on admission. The canal close to the drum membrane was in all cases found free from pyogenic organisms.

In four cases of purulent otitis media a culture taken two, three, six and ten days, respectively, before the onset of the otitis media showed the deeper canal sterile. While this was an abundantly long time to permit deeper penetration, yet taken in conjunction with the fact that no case at any stage was found with an infected canal (in its deeper portions) we think argues against the theory of infection by this route.

The bacteriological examinations of the pus from the middle ear in 22 cases showed staphylococcus aureus in pure culture four times

streptococcus in pure culture eight times and these two in mixed infections six times. The pneumococcus was found twice. *Bacillus diphtheriae* twice.

In seven of the eight cases where streptococcus was found as a pure culture in the pus from the ear, the same organism was found in the naso-pharynx. *Staphylococcus* was demonstrated in the naso-pharynxes of all of the ten cases in which it was present in pure culture in the ear pus.

The typhoid bacillus was not found in any case in either the naso-pharynx or the ear discharges. Theoretically it seemed plausible that the bacillus typhosis might be present as an initial factor, mixed infections with pus cocci developing later. With the object of determining this, eight cases were incised early and the cultures taken with a sterile probe inserted through the incision, before there had been opportunity for the proliferation of air borne organisms. In no case was the typhoid bacillus found, though pus cocci always were, evidently having gained entrance through the Eustachian tube. Evidently in both classes of cases (the one we believe due primarily to infection, the other to embolism or thrombosis) the pyogenic organisms were evidently present but were unable to proliferate freely until the required conditions of soil were developed. To prove this, in examining the external auditory canals of typhoid fever cases, free from otitis, in three instances the membrane was incised under aseptic precautions and a culture taken from the mucosa of the middle ear itself. Again no typhoid bacilli were found, but in all *staphylococci* were found. In all three of these cases, this examination was made in the second week of the disease. All of them got well of their fever, without developing otitis. Presumably this was because of lack of conditions of soil, be those conditions what they may—an inflammation of the mucosa due to typhoid bacilli lodged from the blood flowing through the mucosal vessels; or a low resistance of cells or juices due to toxemia; or to a necrosis of the mucosa from anemia due to embolism or thrombosis, or to an anemia from any other cause. Or the typhoid bacillus by causing a non-inflammatory tissue necrosis may have prepared the soil for other more active pyogenic bacteria. As might be inferred from the statement just made, it is not intended to argue from these examinations that the typhoid bacilli may not be the chief etiologic factor because it was not found in the middle ear or in the discharges therefrom. Its attack may have been from beneath the surface by way of the mucosal vessels, and may have even there been rapidly superceded by the all pervading, ever present, pus cocci.

The presence of colon bacilli was suspected to be present in one case on account of the fecal odor of the pus, but it was not found.

The naso-pharynges of 60 typhoid fever cases were all found free from infection with typhoid bacilli. This is remarkable when it is remembered that the sputum almost always contains these organisms. It may be mentioned here as a control, that the same laboratory technique was demonstrating the presence of typhoid bacilli in suppurative complications, other than those of the ear. The pathogenic organism found in the naso-pharynx were:

Streptococcus,
Staphylococcus Aureus,
Staphylococcus Albus.
Pneumococcus,
Bacillus Diphtheriæ.

Besides these there were numerous saprophytes and air organisms.

Before leaving the subject of bacteriology it might be well to recall to our minds the fact that it is now conceded that glandular structures may be the seat of inflammation in the absence of bacteria. Whether the glandular apparatus of the tympanic mucosa can be the seat of such an inflammation we are unable to say.

PATHOLOGY.

It is to be regretted that the difference between the slow and the fulminating types was not noted earlier in the investigations. Had this been done, our observations would have all been with a view to throwing light on the differences in the pathology of the types. It is also to be regretted that there was no opportunity for post mortem investigations into the pathology and pathological histology. It is to be hoped that both these defects will be overcome by a future series of observations.

Bezold considered it open to question whether some of the cases of post typhoid deafness were due to extension to the labyrinth from the middle ear with destruction of the fenestra; or whether it were not more likely that an independent suppurating focus developed in the labyrinth similar to that in cerebro-spinal meningitis. He admits that no such case has been observed. We do not see any basis for it, for all the evidence we have indicates that the labyrinthine symptoms present in non-suppurative typhoid fever ear cases are due, not to infection, but to the circulation of toxins in the labyrinthine vessels.

In cerebro-spinal meningitis we have an infective focus extending outward from within the cranial cavity. No such condition exists in typhoid fever. The infective focus is in the middle ear and has been observed by the writers to involve the inner tympanic wall in two cases. In both these cases, there were labyrinthine complications with permanent total deafness, (fortunately unilateral) and temporary vertigo. There was no facial paralysis.

(TO BE CONTINUED.)

SOCIETY PROCEEDINGS.

NEW YORK ACADEMY OF MEDICINE.

SECTION ON LARYNGOLOGY AND RHINOLOGY.

Stated Meeting, Held May 25, 1904.

DR. FRANCIS J. QUINLAN, Chairman.

Speculum for Illuminating and Packing the Maxillary Sinus After Operation.

Dr. A. P. VOISLAWSKY presented this instrument and demonstrated its use upon a patient.

A New Electric Light.

Dr. JOSEPH W. GLEITSMAN said that he had experienced much difficulty in obtaining good light especially in doing work in the wards of the hospitals. The one he presented, although on the market for two years, had a coiled carbon and gave most satisfactory results and cost but \$2.50.

A New Tonsillotome.

Dr. MAX TOEPLITZ presented this instrument which had worked well in his hands. The fork could be removed and the instrument rendered more thoroughly aseptic.

Exhibition of Anatomical Specimens of the Frontal Sinus.

Empyema of the Frontal Sinus.

Dr. BEAMAN DOUGLASS presented these anatomical specimens which he had already presented at the last meeting of the section:

1. Naso-frontal duct located behind the hiatus semilunaris.
2. Frontal sinus turned backward over the orbit the entire length.
3. Two large frontal sinuses divided by septa.
4. Cross section demonstrating the relation of drainage from the frontal sinus into the antrum by way of the hiatus.
5. A large ethmoidal cell extending to the roof on a level with the frontal sinus which might easily be entered by a probe and mistaken for the frontal sinus.
6. A case with only one frontal sinus. The left sinus extended to the right side and was subdivided by bony septa.
7. Specimen taken from a case, aged 25, in which a small sinus was present on the right side and absent on the left side.
8. Specimen in which the frontal sinus floor was as low as the process angularis.

9. A case in which the accessory ethmoidal cells developed in the processus angularis and drained near the naso-frontal duct so that the discharge from it simulated a frontal sinus discharge.

10. A case in which the naso-frontal duct was internal to the hiatus semilunaris, between it and the middle turbinate body.

11. Case of anterior ethmoidal cell developed within the floor of the frontal sinus.

12. Case in which the frontal sinus instead of draining into the hiatus drained into the accessory ethmoidal cell developed in the processus angularis.

13. An entire ethmoid cell developed within the frontal sinus, reaching from the floor to the roof of the frontal sinus.

Empyema of the Frontal Sinus.

DR. WOLFF FREUDENTHAL presented a man, 20 years old, who presented himself because of an ozena. He found an empyema of the antrum of Highmore and when he made an opening through the alveolar process a great deal of pus came out. Then the symptoms pointed to an empyema of the frontal sinus. He made a typical Killian operation, cutting through the brow directly and then going around the eye in a curved manner, leaving a bridge. He went in first above the brow, which he does not do any more. In using the chisel he broke down the bridge but after smoothing off the edges he left it and with excellent results. He did not pack the sinus but drained it into the nose closing the external wound. The temperature remained normal after the operation until the fourth day when it arose to 104.6 caused by a cellulitis but with only serous fluid; when this was liberated the temperature dropped. Now, *i. e.*, six weeks after the operation was performed, the cosmetic result is so excellent that one can hardly tell the difference between the two sides.

Carcinoma of the Antrum of Highmore.

DR. J. CLARENCE SHARP presented a woman, who, seven years ago had pain in the right side of the antrum and along the right side of the upper jaw. She consulted a dentist who advised the removal of her teeth, one after the other being taken away for the relief of the pain until she was toothless, so far as her upper jaw was concerned. She continued to suffer pain, especially under the eye, which swelled up and became at times black and blue. She fell into the hands of a specialist who discovered that she had an abscess of the antrum. This was opened and drained for three months. During this time she was taught to syringe it out and she continued for five years to wash out the cavity. She finally came to the Presbyterian Hospital in January, 1893, because of the pain and the discharge from the antrum. Her nose was stopped up on the right side. A portion of her right inferior turbinate was removed. She then disappeared from the dispensary and, six months later, returned (this was 18 months ago) with a large growth at the opening into the antrum about the size of a walnut. It was thought to be sarcoma and an operation advised. When it was removed it was handed over to be

examined and the pathologist pronounced it to be a carcinoma and instead of doing a resection Dr. Hawks curetted the antrum; it was then packed and drained. She was then subjected to the influence of radium and the X-Ray with no benefit except to relieve the pain. That was in September. On April 9th she was again operated upon and it was expected that another curettement would soon be undertaken.

The following cases were presented by Dr. BERENS:

Case I. Dr. E., was presented for examination March 5, 1904, by his physician, Dr. R. T. Howe, with a history of having had gripe for three weeks, from which he was convalescing, when seven days ago a severe pain developed in his left frontal sinus. This rapidly grew worse—in spite of careful treatment with adrenalin and other measures resorted to by Dr. Howe. His temperature reached 104°, cedema and redness appeared in the supra orbital region, until at the time of examination this was very marked and caused a partial closure of the eye. On the right side there was tenderness to pressure, cedema and redness about the naso-frontal angle at the inner canthus of the eye. Examination of the nose failed to reveal pus, and while the middle turbinates were not enlarged, yet the frontal and ethmoid ducts could not be found on either side with a probe.

I did not know until the meeting of this Section, March 23, 1904, that I had performed a new operation, but had looked on the procedure followed in this case as a modification of Luc's operation. Dr. Beaman Douglass, however, at the meeting mentioned and in THE LARYNGOSCOPE for May proposed an operation, the technique of which so closely resembles that followed in this case that the indulgence of the members of the Section is requested to a brief recital of the operation as performed on March 5, 1904, in the Manhattan Eye, Ear and Throat Hospital.

After preparation of the external parts the patient was anesthetized with ether. An incision was made a $\frac{1}{4}$ inch in front of the inner canthus of the eye, extended upward and outward to above and beyond the supra-orbital notch. The soft parts were retracted exposing the articulation of the frontal nasal and superior maxillary bones, the supra-orbital notch and the insertion of the superior oblique muscle. A chisel was then used to enter through the frontal bone immediately at the junction of the nasal bone with the superior maxillary bone, into the lowest part of the frontal sinus. As the sinus was entered there was a discharge of very foul-smelling gas, and as the opening was enlarged posteriorly almost to the attachment of the superior oblique, superiorly and externally by an incision $\frac{1}{4}$ inch broad to the supra-orbital notch and somewhat above it, the lining membrane was seen entirely detached from the bone, lying on the floor of the sinus in the form of a dirty-grayish slough. After its removal with a pair of thumb-forceps the whole cavity was seen to be entirely denuded of its living membrane. There was not free pus present. A small chisel was then used to break through the floor of the sinus into the nasal cavity. This perforation was enlarged with a sharp spoon and pus was found in the naso-frontal duct and anterior ethmoid cells. It was found difficult to get rid of the spicu-

læ of bone in the ethmoid region through the wound, so that the curette was inserted through the nose into the wound and the surfaces rendered smooth. The wound in the floor of the sinus resulting from these procedures was sufficiently large to permit of the entrance of the small finger. The middle turbinate was not removed. During the operation a small spot on the septum below the floor of the sinus was found bulging into the wound and examination revealed pus in this sac. It was opened, thoroughly curetted and found to be a diseased anterior cell on the right side, and accounted for the symptoms on that side. A wick of gauze was inserted from the sinus into the nose and the wound closed by sutures, excepting at its inferior angle. The dressing was removed through the nose in two days, and the wound douched through its open inferior angle, which between douchings was kept open by the insertion of a minute pledget of cotton soaked in argyrol. The wound was douched and argyrol injected by medicine dropper for one month, when the external wound had entirely healed. The scar is scarcely perceptible—and I doubt if the gentlemen in the front row can detect it. Following the operation there was a squint, but this is rapidly disappearing. The case shows no pus, although there has been no treatment for several weeks.

Case II. Mr. G. B., age 43, was presented for examination March, 17, 1904, with a history of having had grippe, followed by pain and redness in and over the left eye three months before. Nasal examination revealed the mucous membrane atrophied on the left side, with myxomatous degeneration of the middle turbinate anterior to and through which pus is exuding. There was much tenderness to pressure and some swelling over the left eye. The left frontal sinus was dark under transillumination; the other sinuses were clear, except the left ethmoid. Three weeks later transillumination showed the whole left side dark, and there were pains in the vertex and occiput. At this examination a cotton-armed probe entered the sphenoid but showed no pus.

On April 14th the same operation was performed as that performed on Case I., and in addition thereto the whole ethmoid region was exenterated and the anterior wall of the sphenoid sinus was broken down with a curette and much myxomatous tissue removed from its cavity. The distance of the posterior wall of the sphenoid from the glabella was $4\frac{1}{2}$ inches. The frontal wound was prolonged outward somewhat further than in Case I, because the presence of myxomatous masses and a network of bony partitions at its external angle necessitated a larger wound for their removal. The lining of all the cells and sinuses was myxomatous and there was much free pus present. The wound was packed through the nose after first inserting a wick of gauze through the floor of the frontal sinus into the nose. The external wound was stitched as in Case I. The dressings were removed in two days and not reinserted. There has been no treatment other than home douchings for three weeks. The sphenoid wound is practically filled with healthy granulation tissue.

Case III. Mr. K., was first seen April 4. Six years previously he had been injured over the right eye. Since that time he had had intermittent headache localized in the right frontal sinus and extending into the left. This pain had always been relieved by the discharge of pus from his nose. For nearly two weeks he had no discharge, but there had been great pain accompanied by fever and sweating.

Examination of the nose revealed a fairly normal condition. No pus was detected. The patient was in such evident distress that he was operated upon in the Manhattan Eye, Ear and Throat Hospital the day following. The same operation was performed as in Case I. A great quantity of free pus was found but little disease of the membranes, excepting at the floor and over the remains of the septum. The latter was almost entirely absent excepting at the superior angle of the cavity and at its floor where it was present only as a ridge. Both frontal sinuses were unusually large, there being no disease of the membranes. They were not removed excepting at the floor. The dressings and after-treatment were as in Case I.

A Case Illustrating the Liability of Fallacious Diagnosis.

Dr. LEE M. HURD presented a patient, male 19 years old, who when first seen had frontal headaches, pain and tenderness over right frontal sinus. Purulent secretion was found about anterior ethmoidal cells (most of the ethmoidal cells had been previously removed). The frontal sinus was entered by the nasal route which increased the flow of pus in the nose and the headaches and pain disappeared for two weeks when they returned and the hole into the frontal was found to have closed. The sinus was opened again the symptoms disappearing for about two weeks when the frontal was found to be closed again. An incision was made along the eye brow and the sinus entered through the anterior wall about half of it being removed, the frontal was found to be normal. On entering the naso-frontal duct, soft bone, granulations and pus was found in the small themoidals just in front of the duct also in one fair sized cell behind the duct. These cells were curetted the sinus packed, wound closed, packing removed on third day, uninterrupted recovery. Both frontal transilluminated dary.

A Case of Extreme Sepsis from Multiple Sinusitis-Operation.

Dr. W. W. CARTER reported this case: A. M., female, aged 22, healthy until four years ago, when, following grip, she had a continuous discharge of pus from the nose for two years. Occasionally the discharge would stop for two or three days when the left side would become swollen and painful and the conjunctiva of the left eye injected. These attacks were always relieved after a large amount of fetid pus was discharged. Examination showed the patient's condition good, but intellect dull, pus flowing from the left middle meatus, and polypoid degeneration of the middle turbinate. Posterior rhinoscopy showed pus flowing over the inferior turbinate and into the pharynx. Transillumination showed the left antrum to be opaque while the frontal sinuses seemed to be normal.

As removal of the middle turbinate and enlargement of the ostium effected no improvement he decided upon a more radical operation. The antrum, which was found filled with pus and the walls covered with polypoid tissue, was cleaned out and scraped. The inferior turbinate and the inner wall of the antrum down to the floor were removed, and the anterior ethmoid cells curetted.

The third day after the operation the patient complained of pain in the knees and wrists and also of extreme occipital headache. The legs were slightly swollen and oedematous; the joints were sensitive to the touch but contained no fluid. The temperature had a diurnal fluctuation between 99 and 103, the tongue dry and brown, bowels loose, though the vaginal secretion showed no gonococci. Blood examination showed moderate leucocytosis.

The urine which before the operation was normal now showed granular and hyaline casts and a small amount of albumen. The patient passed only twenty ounces in twenty-four hours, and the urea was much diminished.

The condition of the antrum appeared satisfactory, but there was an abundant flow of pus from the posterior ethmoid cells and possibly the sphenoid was also infected. At this time the symptom complex presented by sepsis, nephritis and multiple arthritis was most bewildering. These conditions persisted for about three weeks with loss of strength and extreme emaciation. Then after two weeks of comparative comfort the articular symptoms returned with increased severity. Nearly all the joints were involved, the eye-ball seemed to protrude and the conjunctiva was congested. Ophthalmic examination showed a normal retina. The urinary symptoms were unchanged. On Jan. 9, 1903, the patient had a violent chill and the temperature arose to $106.2-5^{\circ}$, pulse 150; she became unconscious, had retention of the urine and incontinence of feces and every appearance of profound collapse. Under vigorous stimulation and the injection of three pints of normal saline solution into the median basilic vein she rallied. Under tonic treatment her condition improved, though the urine still contained casts. On Jan. 23, two months after the last operation it was decided, after consultation, that it was a case of violent sepsis. Though but slight hope for her recovery was entertained, Jansen's operation was performed. The antrum was opened and the anterior ethmoid cells and the sphenoid, all of which were filled with pus, were curetted. Recovery from the operation was good. There was a steady improvement in all the symptoms. The convalescence was interrupted by only slight rises in temperature and she was discharged from the hospital twenty-five days after the operation. At this time the joints were still quite stiff and the legs oedematous, but the amount of urine was normal and there were few casts. Since this time the patient had improved steadily, though on the 18th of April there was a slight muco-purulent accumulation in the region of the posterior ethmoid cells and the sphenoid.

The points which he wished to emphasize were:

1. The difficulty in making a diagnosis when the symptom complex might be a result of sepsis, nephritis and multiple arthritis.

2. The seemingly entire dependence of all the symptoms on the sinus infection, and their prompt relief after operation.

Case of Frontal Sinus Involvement and Chronic Empyema.

Dr. BEAMAN DOUGLASS presented this man who gave, as an only symptom, periodic pain with hyperæmic conjunctiva. An oculist had excluded all sources of his trouble except pressure from outside the orbit. He finally decided to open the frontal sinus on the right side and, so soon as this was done, pus rushed out in quantities.

Case of Frontal Sinus Abscess.

Dr. DOUGLASS presented this case which was simply one of ordinary frontal sinus abscess.

Frontal Sinusitis.

Dr. DOUGLASS presented this case. The diagnosis had first been made of supra-orbital neuralgia. The internal method of operating was used.

Case of Frontal Sinusitis.

Dr. DOUGLASS presented this patient who had a frontal sinusitis, multiple sinusitis, etc. He was well on one side but the other was still discharging pus. Drainage was through the middle meatus of the nose.

Case of Pansinusitis.

Dr. DOUGLASS presented this case. One side had been operated upon through the antrum and the sphenoid and ethmoid cells had been removed.

Case of Frontal Sinusitis.

Dr. DOUGLASS presented a woman; she was a one-sided case and was well today.

Case of Pansinusitis.

Dr. DOUGLASS presented this patient who was referred to him from the nerve clinic, suffering from an intense occipital pain. It was a case of frontal sinusitis, diseased ethmoid cells and antrum disease.

It was interesting to note that not one of these cases had been operated upon under anything but local anæsthesia. Cocaine was used and not once was a general anæsthetic used. He no longer employed general anæsthesia for sinus work. He never used a stronger solution than a one-half per cent solution of cocaine.

Dr. LOGAN TURNER of Edinburgh—I am very much obliged to you for your kindness in asking me to make some remarks on this interesting subject and I greatly appreciate the privilege and courtesy shown me. I will not detain you long. I was extremely interested in all that I saw and heard. The anatomical specimens presented were very interesting and, as Dr. Myles has stated, there are so many different sinuses to consider that one cannot tell whether

any special operation is required or not. Regarding the Luc operation I am more and more coming to the opinion that the less we do this operation the better will our successes be for, as Dr. Myles said, there are so many recurrences. Even Luc himself in a recent paper states that he is not so fond of the operation as he was. When the sinus is small, when the inflammation in it is not of long standing, and when the ethmoid cells are not affected do not perform a radical operation. But, on the other hand, if the sinus is large, and if it is complicated, and the ethmoid cells are affected, then I think that there is nothing like the radical operation. I think, furthermore, that we should consider the radical operation earlier because to operate and re-operate adds greater risks to the patient, certainly after the third operation. The question though before us is how best to avoid the disfigurement? This disfigurement is what makes for us the difficulty and the question is "How can we avoid it?" This brings up the question of the Killian operation which I am inclined to view with favor and, if possible, I should like to show some photographs of it which I have in my possession. Killian operates, but prevents much disfigurement by keeping the bridge; and its only fault is that it does not completely obliterate the sinus. It removes the anterior wall and floor but a certain cavity must continue to exist just behind the bridge, especially near the center of the bridge. In Killian's operation there is removed the ascending process of the superior maxillary bone because it gives better access to the ethmoid cells.

In regard to illumination for diagnostic purposes transillumination is of no value; but in post-mortem and clinical work it may be of aid. In diseased frontal sinus by this means we can get an outline of its size, but, in a large portion of the cases, there is no sinus, or the bone is too thick to allow any transillumination.

The Prevention of Middle Ear Catarrh—JULIUS VEIS—*Monatsschrift f. Ohrenheilkunde*, Feb., 1904.

The author disapproves of the method of blowing the nose generally recommended, *i. e.* to hold one side shut while blowing the other, as the nose may be so occluded by hypertrophies as to raise the air-pressure in the naso-pharynx to a dangerous degree. He therefore advises that blowing the nose be done with both nostrils open, and that the handkerchief be held away from the nose. He states that this method of blowing the nose becomes very effective after a little practice.

YANKAUER.

